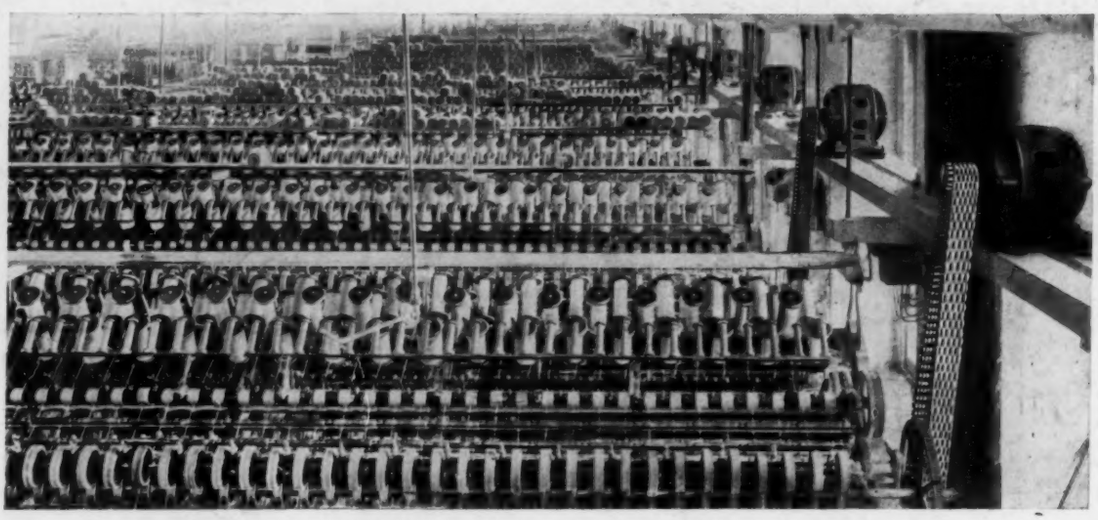
COTTON

APRIL, 1913

Increase the Efficiency of Your Machines



5 H. P. Link-Belt Chain Drives Operating Knitting Machines

Do you realize what an important part your power transmission equipment plays in your daily output? Too often, even in mills employing the most modern methods in other departments, the **Drive** is overlooked. Old time methods of transmitting power are considered "good enough."

But in this day of keen competition, mill owners cannot afford to overlook the leaks. Every unit must do its share of work without waste, and the **Drive** from your motors to machines and line shafting is just where the leaks occur, and where constant efficiency is required.

The smooth positive **Link-Belt Silent Chain Drive** results in fewer broken ends than any other known form of power transmission. Its efficiency over belting has often increased production from 17 to 25 per cent. Its compactness, silent running and economy of power make it superior to the gear drive. It offers no obstruction to light, no danger to employes. It is the logical drive for the modern textile mill.

If you want to increase the efficiency of your machines and increase your daily output, investigate the LINK-BELT SILENT CHAIN DRIVE. Read page 24 of our catalog 144C, which we send to interested parties on request. Address our nearest office.

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Alphabetical and Classified Index to Advertisements Following Reading Pages

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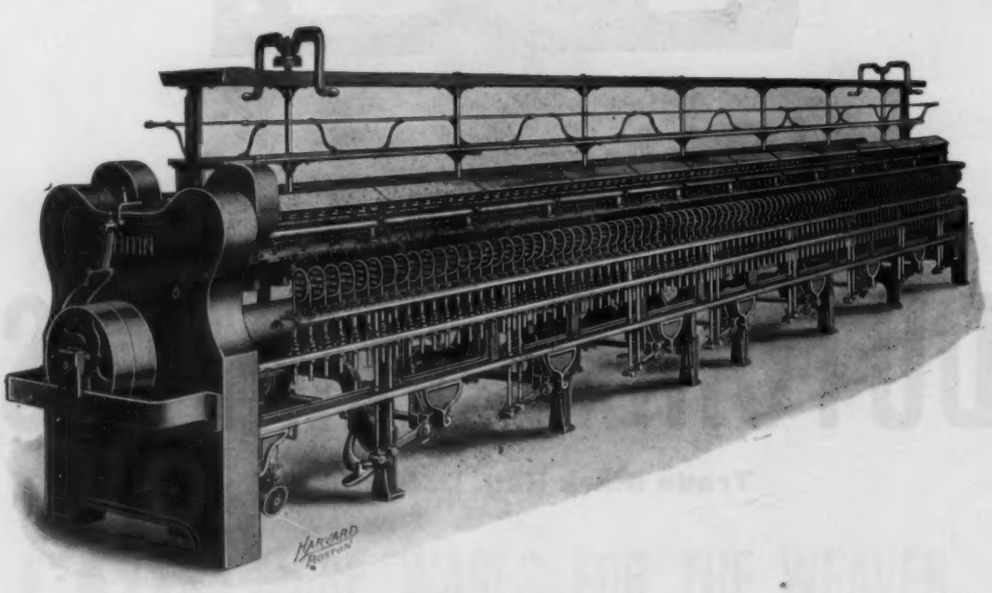

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Manufacturers of Carding, Spinning and Weaving Machinery for Cotton Mills.

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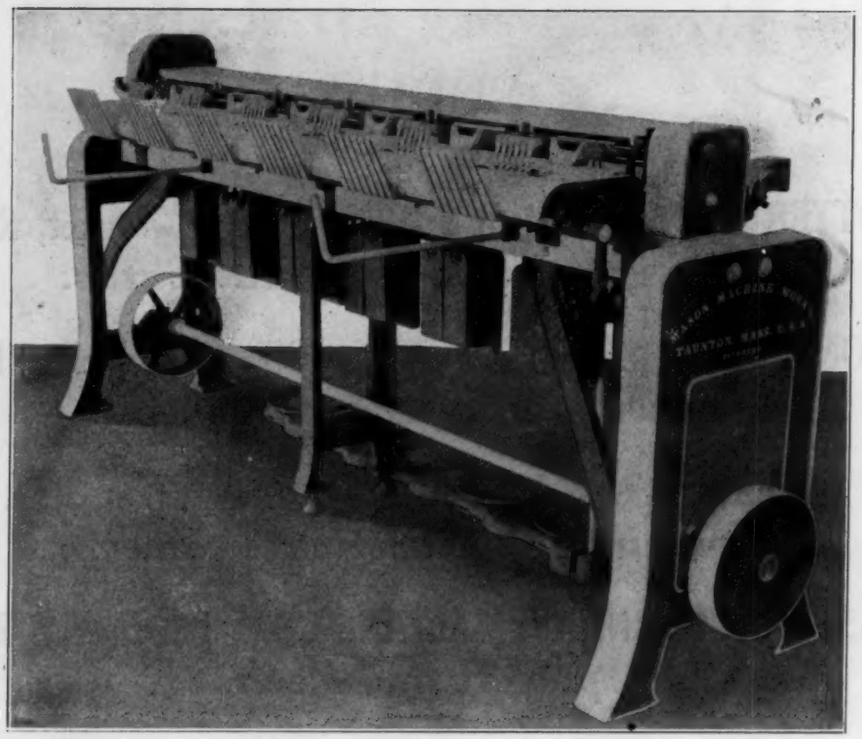

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Works and Main Office, Taunton, Mass.

Southern Office, Charlotte, N. C. - - Edwin Howard, Agent

We Supply **SUPERIOR LOOM CRANKS** to many mills for repairs of looms not built by us.

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POTTER & JOHNSTON MACHINE CO., Pawtucket, R. I.
Pickers and Revolving Flat Cards.

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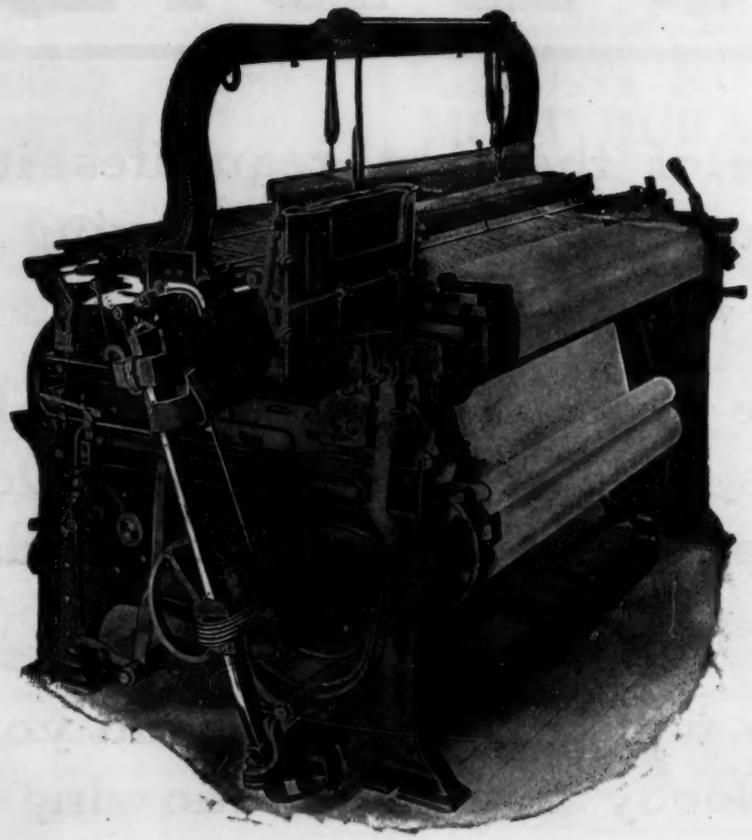

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Looms for Every Known Fabric

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LIGHTEST RUNNING
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Have you seen our 1910 Diamond Finish

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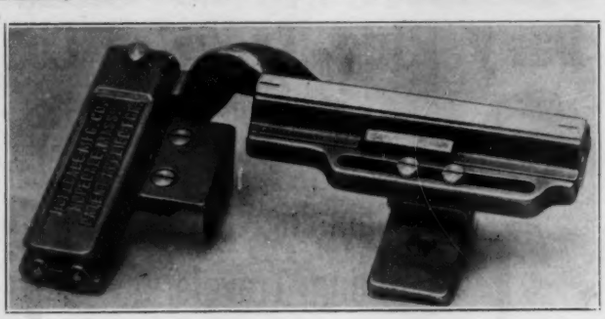

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**Improved Temples,
Temple Rolls, Drop Wires and a
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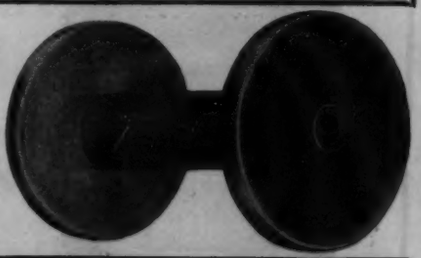
You say your loss from broken spools is but a mere trifle



Did you ever attempt to prove that statement? Do it, for your own satisfaction. The magnitude of this waste is not readily apparent in the stress of other matters, but if you will apply yourself to the matter you'll see it is a big item on the wrong side of your ledger. Our METAL PROTECTED SPOOLS will save practically all this loss for you. They rarely ever break or separate. When you consider that it's the full spool which breaks, you'll see why our METAL PROTECTED Spools save you big money. The metal does not rust or stain the yarn. It protects both the outside and inside of spool. We are making a special trial offer to mills who have never used our spool. Write for this offer and sample spools at once. ADDRESS

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OF EVERY VARIETY

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If it does not come up to your standard of what a good lubricating oil should be, and you consider that it is not worth our price—put your own value on it and remit on that basis. Isn't that a fair proposition? "A. C. C." will pare down your oil and cylinder repair bills—save your piston packing, too. It has been doing this for forty years, it will effect such a saving now — just give "A. C. C." a chance.

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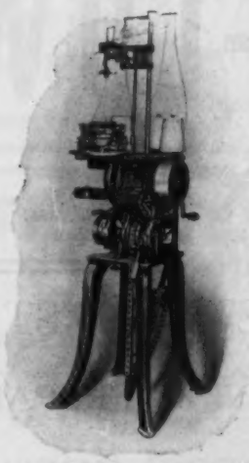

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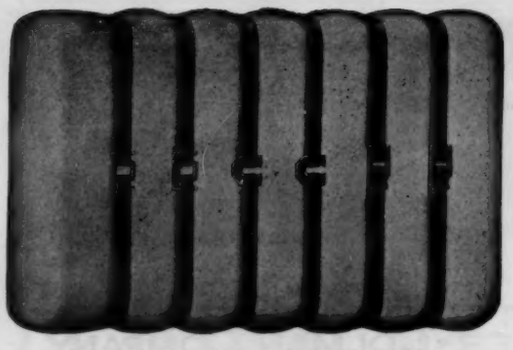

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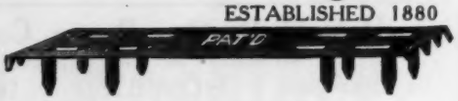

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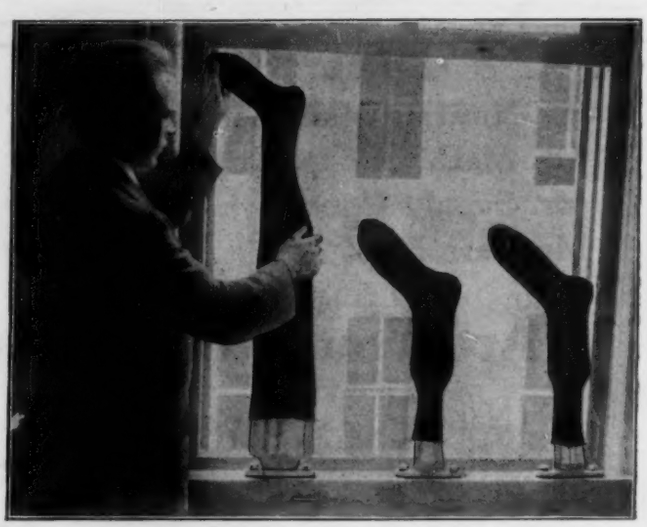

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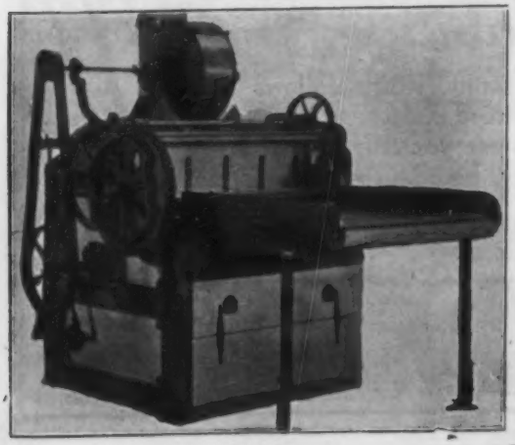

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For opening and dusting Wool, Cotton, Linters, Hair and kindred fibrous substances.
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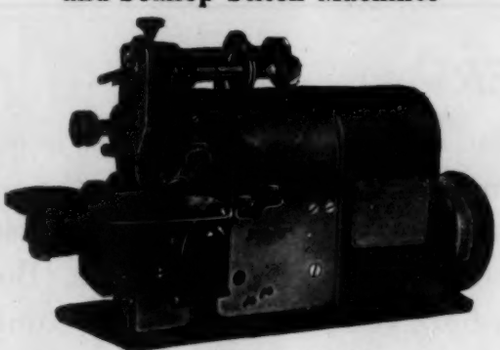

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For Trimming and Overseaming in one operation produces the strongest seam with the greatest economy.

USE STYLE 60S for welting Stockings, blind stitch.
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Underwear, Sweaters, Cuffs with Cut Welt, Selvage, or French Welt, Mantles, Collarettes, Toques, Golf Caps, Hosiery Tops, Skirts, Borders, Corset Covers, Button Stays, Mittens, Bandages.

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Established 1889 **NORRISTOWN, PENN.**

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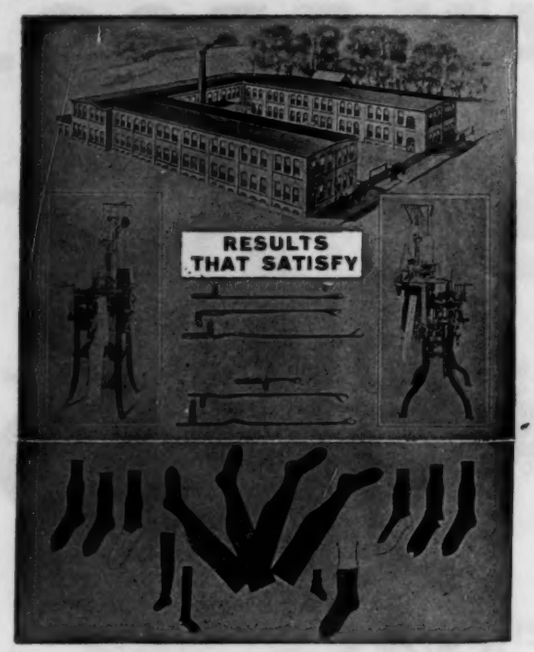

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For Knitting the Latest Style Fabrics.

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The Stafford and Holt Pineapple Stitch Machine is the Latest

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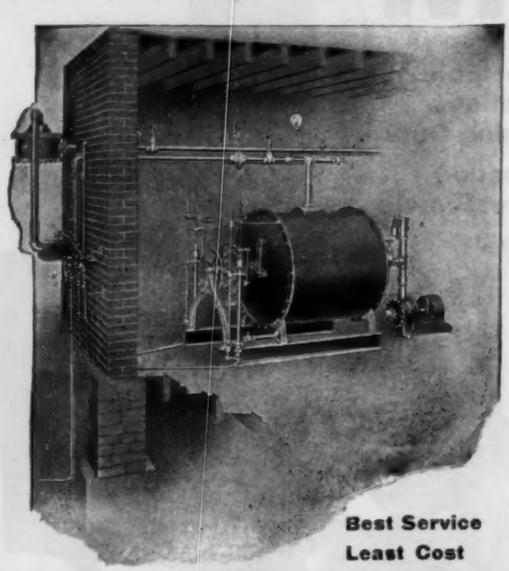

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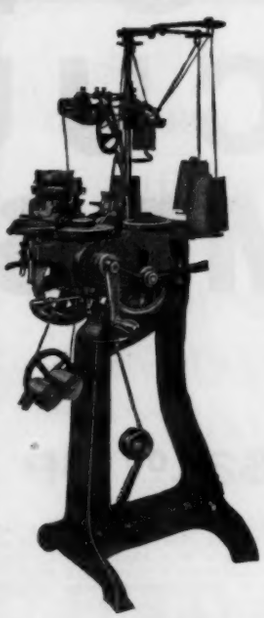

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Takes Up Its Own Wear

ABOVE ILLUSTRATION SHOWS 7 OF THE

8 SIZES

$17.00 UP

FOR BLOWING OR SUCTION

BLOWERS VACUUM PUMPS

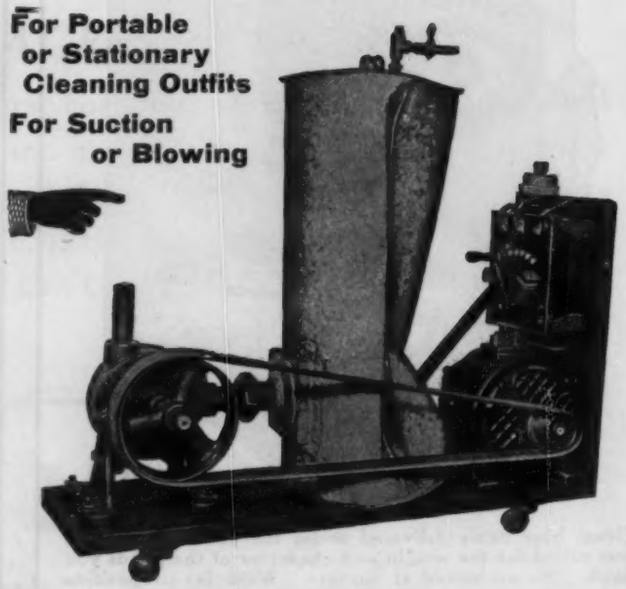
This picture shows the power of the smallest size vacuum pump we make. The Tank was cross-braced inside and is of heavy galvanized sheet iron. While we do not recommend the pumps for more than 20 in. vacuum, this collapse occurred under test at 22 inches. A quarter horse power motor was used.

7 SIZES, $21.00 UP

Examine the illustration showing the interior of the machine above and you need not be an expert mechanic to see why they are so very effective. To see why they take up their own wear. To see why they can maintain a very high vacuum. Notice also the comparative size of the piston and the cylinder and also the large interior capacity or displacement of the pump. Compare these features with any other vacuum pump or blower you have ever seen and then we are sure of what your decision will be.

For Portable or Stationary Cleaning Outfits

For Suction or Blowing



GET CATALOG 109 FOR BLOWERS

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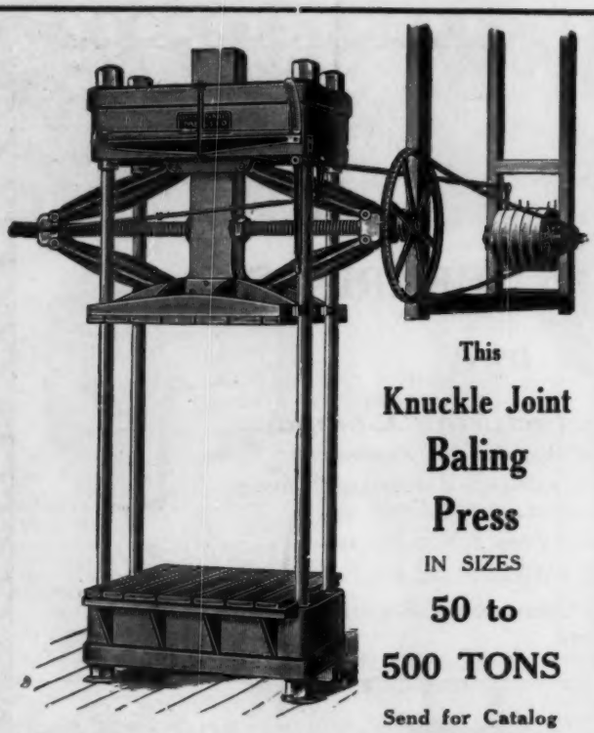

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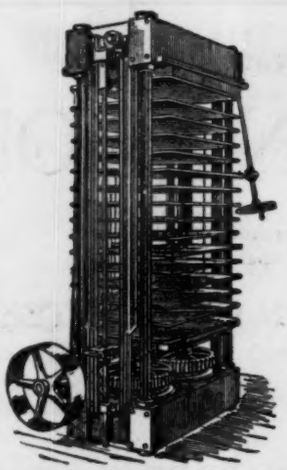

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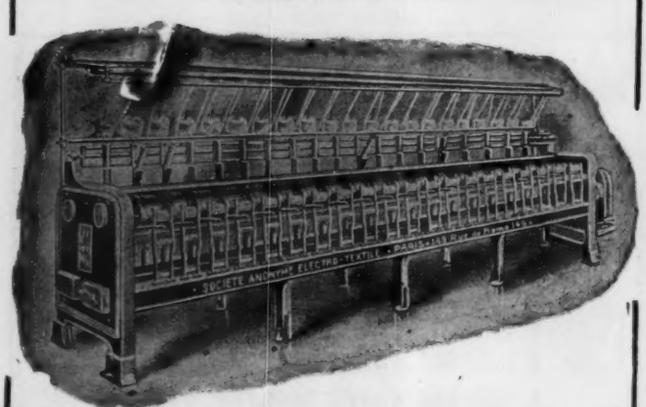

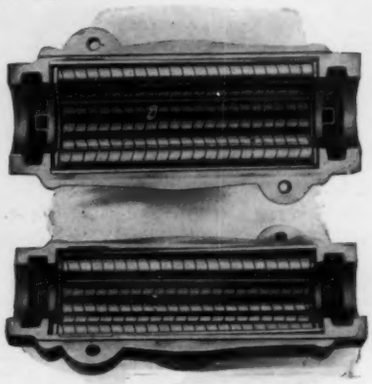

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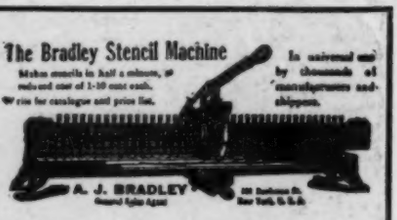

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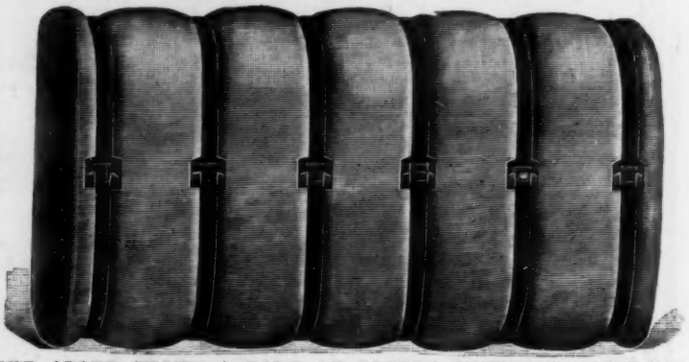

THE ABOVE SHOWS A BALE OF COTTON SECURELY FASTENED BY OUR BALE TIES AND BUCKLES
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Lint cannot cause trouble with Westinghouse textile motors.

The brackets, windings and rotor present smooth, rounded surfaces which offer no opportunities for lint to accumulate.

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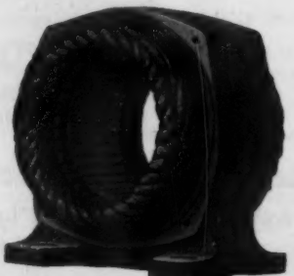
The operating characteristics are specially modified for textile service. The proper motor can be supplied for each machine.

These special features mean thoroughly satisfactory service to the user.



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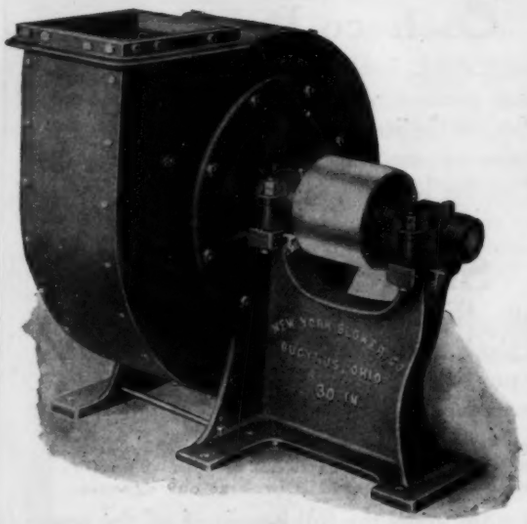

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CAN BE SET AT ANY ANGLE

The Wheel

is made in one piece as the blades are cast into the cone back, thus eliminating the use of bolts, nuts, or any other obstruction.

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you could swing it open and gain perhaps a solid hour of extra daylight. What would that be worth to you—in reduced lighting bills alone, to say nothing of the increased efficiency of your employees?

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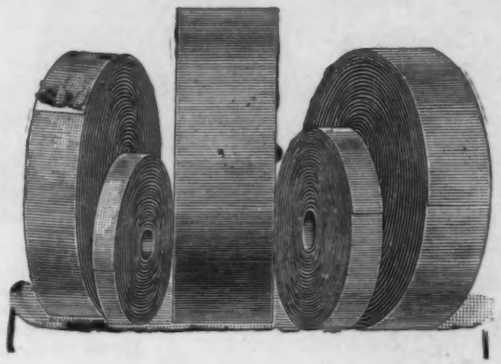

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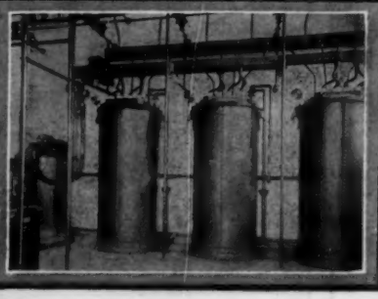

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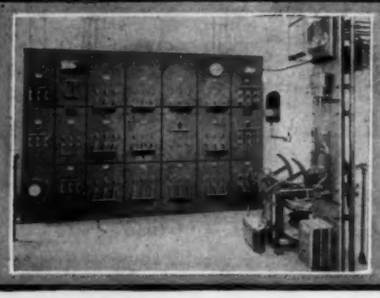

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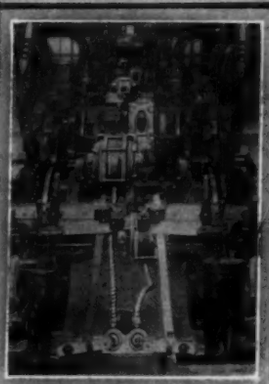

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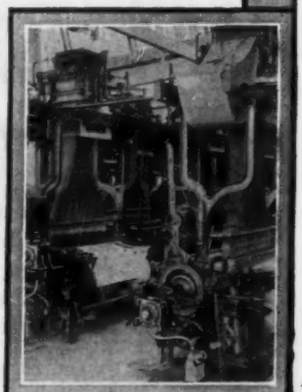
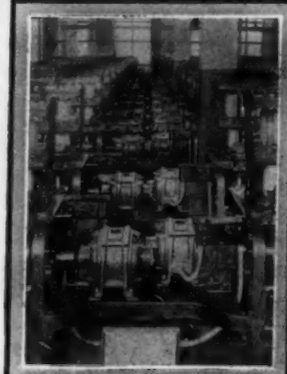


Jacquard Loom Drive.



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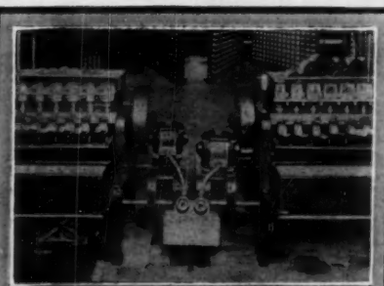

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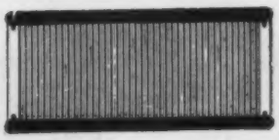
LOOM  **REEDS**

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FACTS ABOUT SOUTHERN LABOR CONDITIONS.

The ninth annual child labor conference of the National Child Labor Committee was held in Jacksonville, Fla., during the past month. The general topic for discussion was "Child Labor and Poverty." Sessions were devoted, it was announced, to a survey of the child labor situation in the South and pending legislation. Among the subjects on the program were the "Textile Industry and Child Labor;" "From Mountain Cabin to Cotton Mill;" "Social Welfare and Child Labor in the Southern Cotton Mills;" "Child Wages in the Cotton Mill;" "Our Modern Feudalism;" "The Hookworm and the Cotton Mill;" and "The Story of My Cotton Dress."

The persistence exhibited by some classes of social reformers in formulating a theory and then sticking to this theory regardless of the actual evidence, (evidence that is easily assimilated by any person with an open mind), is becoming one of the wonders of this country. Thanks to the cotton manufacturers the child labor situation in the South is daily growing better and with the exception of an occasional "awful example" which may usually be found in any city of any section of the country owing to exceptional and personal conditions applicable only to each particular case, (see the recent report of the New York State Factory Investigating Commission), the present mental, moral and physical condition of the children of the sixteen Southern states are the equal of those to be found in any other section of the country. Insofar as this pertains to the children located at or in connection with textile mill communities, the Southern conditions are much better than those to be found among working people elsewhere.

The book recently issued by Major Dawley, "The Child That Toileth Not," which was reviewed in COTTON for September, 1912, gave many illustrations of true Southern conditions as he found them when making his investigation for the government. He has, however, been accused of being biased because of a desire for revenge and also for financial reasons.

In another part of this issue appear some extracts from a recent pamphlet by John F. Schenck, treasurer of a North Carolina mill, and chairman of the legislative committee of the N. C. Cotton Manufacturers' Association. It is probable that Mr. Schenck will also be accused of bias, not only because he is a cotton manufacturer, but also because of the unqualified approval he gives to Mr. Dawley's book in a note in the back of his pamphlet. He concludes this note by saying, "That book should occupy a position in every school library and every public and private library in the state."

Still later there has appeared in the New York Times an interesting communication by Marion Hamilton Carter on this subject that is so well worth reading that it is reproduced elsewhere in this issue. Commenting on this communication the Times says:

"A letter to the Times appearing yesterday from Marion Hamilton Carter, who has investigated the labor of children and women in the Southern cotton mills, corroborated the testimony of Mr. Dawley's book, "The Child That Toileth Not," that the boys and young girls and women who "slave" in these hives of industry are not hurt, but benefited by their work. Mrs. Carter's letter was ample in specification and earnest in manner. It contradicted as flatly as Mr. Dawley's report—which, as its Special Investigator, he accused the Department of Commerce and Labor of suppressing—the reports of various philanthropic agents who have come up from the South in recent years with tales of horrors in the mills.

"These workers Mrs. Carter stigmatizes as sentimentalists and salaried agitators. In a statement accompanying her letter she remarks that if destruction of the nervous system by mill work occurred, it would be shown in the asylum and hospital commitments from the mill population. South Carolina is the banner state in cotton manufacture, yet in the eighty-fifth annual report of the State Hospital for the Insane, the female mill population, on whom the work is supposed to bear most heavily, estimated at about 38,000 in 1909, committed only six individuals, two of them suffering from pellagrous insanity; that is, one in every 6,333 females of all ages. At the same time the women teachers of South Carolina, some 2,400, according to the state superintendent of public instruction, committed four, or one in every 600. Housekeepers double the female mill population, contributed 73, most of them farmers' wives."

These are interesting facts, and inasmuch as Mrs. Carter can hardly be truthfully accused of bias, they only go to further prove the earlier statement that the actual evidence is here waiting to be fairly examined and assimilated.

When a man has spent sixteen of the best years of his life making a study of conditions of living in and around the cotton mills as a part of the duties attached to his pastorate, and when it is further considered that much of this time was spent in Gaston county, North Carolina, which has a greater number of such mills than any other county in the South, it would not be doing justice to the subject to leave out the expressions of the Rev. W. C. Barrett, of the First Baptist church at Gastonia, N. C. In a recent letter to the *Charlotte Observer* he says, in part:

"Since I entered the ministry in 1896 I have tried to give special attention to every cause that tends to bless and elevate humanity. At times I have had good opportunities to study the labor question in cotton mills. I have tried to gather information that would be of service in solving the labor problem. There are few questions that deserve more careful consideration—the mill men, that is, those who own and manage the mills—the mill people, that is, those who work in the mills, their condition before coming to the mills, their present condition as compared with their former condition, and the possibility of improving their condition by legislation.

In my study of mill men I have tried to secure information that would lead me to a correct conclusion of their idea of the relations existing between them and their help and their sense of obligation to their help. Without an exception they seem to want to help their people to live better and have more. They are men of high moral standing. Every one I have ever approached for help to improve the moral, social or religious conditions of the people have responded gladly and liberally. There may be some who oppress and abuse their help, but I must believe from my observation that they are very few. Most of the men who manage the mills as superintendents and overseers are men who were once poor boys, and many of them worked in the mills. They are glad to encourage and help any one who will try to help themselves.

"I have made a more careful study of those who work in the mills than those who manage them. By coming to the mill they have bettered their condition. They have better food and better clothes, better houses and lighter work, better schools and better churches. They do not want to return to their former condition. Many of them will gradually grow worse at the mill as they would anywhere else, until they finally become a care for the state or the church. Others of them are saving their money, buying homes and leaving the mill when they become able. I do not object to legislation that really protects the interests of the people, whether it be health or money or anything else, but we should be very sure that we are going to benefit those for whom we legislate before we enact laws."

W. R. Shelton, pastor of the Methodist church at Tuxedo, N. C., was recently requested by the "Reform League" of that state to favor the then pending state child labor law in a pulpit address. He published a letter in reply, which contained the following interesting statements:

"Having been closely associated with cotton mill managers, their methods and employees for over a year, I was in a position to arrive at the truth first hand; and, after doing so, I must say, as a minister of the Gospel, that I cannot conscientiously favor a form of legislation that is, undoubtedly, directed against conditions that do not exist, except, perhaps, in the minds of those who have been borne away on the wings of sentiment, and that strikes a blow at the source of as great a variety of blessings and advantages as have ever been in reach of the struggling masses of our country.

"To say 'variety of blessings' and I mean what I say. I have gone back into the coves and dark corners of this beautiful western section of our state and, after seeing the pitiable and unbelievable circumstances in which so many of our people live, there arose from my lips a prayer that some civilizing influence might develop which would appeal to these people, and now I am well convinced that the mill industry is the nearest approach to this influence that has yet dawned upon us. Every day I look into faces that seem to grow brighter and more intelligent each time I see them. What brought about this rapid evolution? There can be but one answer; it was a respectable church, a school house, a living wage and a general elevating atmosphere, or in one word—environment."

The proper environment will do more to improve a people mentally, morally and socially than all the legislation ever enacted. We now wish to call attention to the illustrated address of Dr. E. H. T. Foster, on page 209. Dr. Foster was sent to Charlotte, N. C. about two years ago by the International Committee of the Young Men's Christian Association at New York, as secretary of the Industrial Department. He has recently been made business secretary of the Southern Industrial Institute at Charlotte, an arrangement whereby the institute becomes more fully and effectively a part of the Y. M. C. A. movement. In his address the conditions at various Southern mills are illustrated, not only by an intelligent man, but by one admittedly without other motive than pride in his work.

CHILD LABOR IN THE SOUTH.

The following communication from Marion Hamilton Carter, of New York City, appeared in a recent issue of the New York Times:

"I am glad to see the comment in the Times about Mr. Dawley's book—and work—on 'The Child That Toileth Not,' and hope the way you have taken it up will prove an entering wedge to let in the truth about child labor in the Southern mills; also, a little truth on the subject of suppressed reports when the findings of the investigators employed run counter to 'interests' with friends in the departments—as was the case with the Cutting report on pellagra in Italy.

"Mr. Dawley was but one of a number of people, myself among them, whose view on the question of cotton mill child labor underwent radical change after seeing the situation at first hand under the prevaliing conditions. I first became interested while on McClure's Magazine some four years ago through the preparation of my articles on the hookworm and pellagra which entailed my spending a summer in the Carolinas. Dr. Stiles had called my attention to the fact that child labor in those states was automatically stamping out hookworm disease through the sanitary conditions enforced by the mills; that in some of the older mills now running with third generation help hookworm was almost unknown; that 'spinner's anæmia,' about which the agitators have made such a to-do, laying it to the presence of cotton lint in the air, was simply hookworm disease contracted outdoors; and that the 'wretched, feeble children' so feelingly pictured and storied were mostly fresh from the 'hookworm farms' and had come to the mills—to be cured!

"With this startling aspect of a case I thought settled in my own mind, I was naturally anxious to visit the mills and see for myself, and I did so without hindrance to the limit of my time. Everywhere, on presenting my credentials, I was met with courtesy and interest by mill owners, superintendents and managers. So far from being debarred entry, or allowed in only after 'things had been fixed up for visitors,' I was literally turned loose to go and come as I pleased, invited to make myself at home anywhere from the president's office to the basements; talk to any child or adult; and room bosses were instructed to provide me all facilities for gathering whatever information I might wish. 'The largest mill in the world under one roof even offered me free access to its books with the services of the clerical staff thrown in if I wished to determine the matter of children's attendance and earnings.

"In this way I came into contact with scores of people in every department of the industry, from presidents down to doffer boys and sweepers, and got the personal point of view, not of one or two, in one or two mills, and not of a few anæmic hookworm cases, but of children, young people, women and men who had worked in the mills for years and in sometimes as many as a half dozen different places.

"The economic side of the question I may pass over briefly, noting only that nearly every child or young girl I talked with had money saved up in the bank, some few as much as $200; that they were, in the large mills, better housed, better fed, better dressed, better entertained, better schooled and churched than the rural population. One special item that I have never seen stated is too good to lose—Moneghan Mills in the Piedmont owns a large tract of land on which its village and Christian Association building with gymnasium and swimming baths are situated. Of this tract, 200 acres were set aside as pasture, free to every family working in that mill. At the time I was there, the village owned more than half as many cows as there were families—enough to supply the entire village with warm, fresh milk twice a day. Each family had besides about a quarter of an acre of garden and the majority kept chickens.

"But there is one aspect of child labor investigation needing the services of a trained psychologist, viz: What is the result of any particular form of it in mental and motor co-ordination? Now, what does the cotton mill make of the child as an efficiency machine?

"This question flashed into my mind while watching a little girl and wondering 'how she did it.' For I had been suddenly struck with the amazing dexterity of her motions—the very perfection of efficient co-ordination, and at top speed. I consider myself rather above the average in manual dexterity, but when, under her direction, I tried to repeat what she was doing, I found even after practice I only approximated her perfection of motion at about a tenth of her speed.

"With that insight into the training values of the work, I went after the teachers' opinion with the question, 'How do the mill children compare with others in your class that have never worked in the mill?'

"Everywhere I received the same answer: 'The mill children are better pupils. If they have worked in the mill two or three years before coming to school they learn to write very easily; they learn to read faster; they have far more attention, and, as a general thing, better memories! almost without exception they are more industrious, more ambitious, more anxious to get on and be promoted, and more appreciative of their limited opportunities.' One enthusiastic young teacher told me she would 'ask nothing more delightful and inspiring than to get hold of a class of mill children, say thirty, who had worked two or three years. And wouldn't we just hum over the ground!' she added, with the joy of a devotee.

"It seemed to me that a training that makes a youngster 'an apt pupil and a quick learner' while helping him lay up money in the bank, and whom his teacher loves because of it, must have some points of merit to recommend it to serious consideration. And here another vital question naturally presented itself: What effect has this mill work on the nervous system?

"I had been reading heartrending accounts of nervous wrecks among women and children, but had seen no signs of anything but the 'nervous prostration' common to hookworm disease. I therefore went after the doctors with the question, 'What particular nervous disorders are induced by mill labor?' and was answered, 'None at all. Dr. William Weston, of Columbia, S. C., who had been attending physician for the Olympia Mills for several years and had had very large experience in the treatment of hookworm, was emphatic in saying that, contrary to his preconceived idea, he 'found the mill population much less subject to nervous troubles than any other class of people in his practice.' General conditions in and about this great mill are in many ways less favorable to health than the mills in the Piedmont section of the state, where the altitude is higher, the summers cooler. Some ten or twelve other physicians from widely scattered localities corroborated his statement, and one, whose main interest was in the children, said he considered them much less nervous than ordinary school children.

"I think there is no one predominant cause for this widely observed fact; but as contributing to it we may note that there is practically no eye-strain to the work; no emotional excitement; that the work is quite monotonous, yet not uninteresting, for it keeps the attention and intelligence mildly exercised; that the children and at least the young girls lead very regular lives; that the air of the mills is purer than that of most houses and kept at a very constant temperature. The cubic air space per person, especially in the spinning rooms where all the children work, is, according to some measures and calculations I made, about twenty times the cubic space allowed per child in the ordinary New York school room.

"Surely there must be some points in favor of an occupation that makes for nervous stability. My position, before and after, was frankly this: I went down South an ardent opponent of child labor; I came home a more rabid advocate than any mill man I ever met; and this because, compared with the dreadful, eye-straining, nerve-exhausting, fad-and-frilly child labor of the New York schools and kindergartens, child labor in the Carolina cotton mills seemed to me a privilege and a blessing. From such studies as I was able to make, I came to the conviction that the sum total of the benefits and disadvantages of the one course intelligently weighed against the other for any given hundred children who are ultimately to become self-supporting were overwhelmingly in favor of the mills. Viewing the situation in its larger aspects—the conditions as they are and were for the families now employed—child labor has been the means, the mills have been the open way through which a people is passing from 'Darkest Carolina' into economic freedom and respectable and respected lives."

TESTING COTTON FOR MOISTURE.

For some time past the question of excessive moisture in cotton has been discussed. The practice of adding moisture artificially to cotton is known to exist, and the need for the establishment of testing-houses at all ports at which cotton arrived was recognized as essential. It is only in this way that a uniform method of investigation can be established, and such testing-houses set up in every European port at which cotton is delivered, would be in a position to make good the charge against excessive moisture, and a great step forward would have been made in obtaining redress.

The Havre, France, testing-house was the first of its kind to be erected by any organization of spinners, and it was built as a result of the strong representations made at the Cotton Congresses. The building is owned and controlled by the whole body of French spinners. Samples of all the raw cotton passing through the port are tested, samples being taken from one-tenth of the number of bales in each consignment. The weight of the sample is about two pounds, and the method employed is to divide this into two equal parts, one of which undergoes a process of drying, in an apparatus which allows of its being weighed without leaving the stove. This sample or "half-test" is weighed every ten minutes, and remains in the stove until it is entirely free from humidity. The last weight recorded is taken as the "absolute weight" of pure cotton contained in the sample. It is recorded, together with the "initial weight" of each of the two half samples, taken before the commencement of the drying process, and the difference in weight between the original figures and the absolute weight gives the basis upon which they can establish the percentage of water contained in the cotton tested.

The results of the systematic investigations carried out at the testing-house, which was established several months ago and has already examined samples from over 20,000 bales of cotton, show that the French spinners, who import about a million bales annually, have suffered severely through excessixe moisture in the raw material. In calculating the excess of moisture the samples were compared with the allowance of 8½ per cent, which is recognized as a spinning standard. As that allowance was made in the sale of yarn, imported cotton was not considered to contain an excessive amount of moisture unless the 8½ per cent was exceeded. On the average, however, it was found that the cotton imported at Havre during the months that the testing-house has been open exceeded this allowance by 1½ per cent. On the whole of the cotton tested there was a gross variation (omitting the 8½ per cent from the calculation) of from 6½ to 14 per cent.

In the statistical records of the testing-house the amount of moisture in each consignment of cotton is calculated as so much loss or gain to the spinners, according as it exceeded or fell short of the allowance of 8½ per cent. The results, taking the mean figures for the whole period from September 20, 1912, to January 9, 1913, shows a considerable variation in the quality of various brands of American cotton, judged by the percentage of moisture. In Texas cotton, which showed the best results, out of 131 testings (10,897 bales) 104 showed a gain (their moisture percentage being below 8½), the average being 0.811 per cent; only 27 showed a loss—averaging 0.753 per cent. In cotton from New Orleans 35 testings (3,025 bales) showed 32 losses, with an average of 2.112 per cent; three showed gains—averaging 0.562 per cent. Of sixteen testings from Alabama (1,221 bales) 15 showed an average loss of 2.561 per cent, and only one showed a gain—1.057 per cent. Twenty-two testings from Georgia (1,774 bales) showed losses in every case, the average being as high as 2.615 per cent; and on four testings from Carolina (350 bales) the mean loss was 3.354 per cent. There were only four testings of Egyptian cotton (200 bales), and they showed an average loss of 1.052 per cent.

The work of collecting samples for the purposes of the testing-house in Havre has been made a great deal easier and more efficient than it would otherwise have been by the erection of a new shed for the reception of the bales of cotton as they leave the ship. The new shed covers 17 acres of land immediately adjoining the quay at which the cotton boats unload. The ground area of the shed is large enough to allow of 60,000 bales being placed side by side, without any bales being piled upon others. Every bale is weighed as it enters the shed, and removed, according to the regulations, within twenty-four hours.

National Association of Cotton Manufacturers.

The spring meeting of the National Association of Cotton Manufacturers will be held in Huntington Hall, Massachusetts Institute of Technology, on April 23 and 24.

Of the total Indian cotton industrial establishments, Bombay possesses 67 per cent of the mills, 70 per cent of spindles, and 78 per cent of looms.

THE RELATION OF WELFARE WORK TO EFFICIENCY*

A Description of the Cooperative Welfare Work Carried on by the Industrial Department of the Young Men's Christian Association in Connection with Southern Cotton Mills.

BY E. H. T. FOSTER, SECRETARY INDUSTRIAL DEPARTMENT OF THE Y. M. C. A.

Since the day when man was asked to leave the garden of Eden he has been forced to do something to provide the necessities of life—hence industry dates from this time. The system of exchange rapidly developed, and today we find it in its most complex form. Everybody has something to sell—some, their ability to manage and finance great enterprises; some, their ability to solve great engineering problems, some their ability to supervise a cotton mill; and some their ability to run a frame or a set of looms. This system of exchange has made possible the great wealth of our country and the happiness of its people. The character of our ability to produce determines largely our position in life and our value to society.

The word efficiency in some form hangs as a pall over us all. You men are intrusted with your respective mills or rooms to make cloth of some kind; yes, more than that, you are asked to make as much cloth as the capacity of your equipment warrants. To "get production," means that you must have efficient labor. This is your problem. Human efficiency is an economic problem and sanitation, education, recreation and Christianization are the factors that determine it.

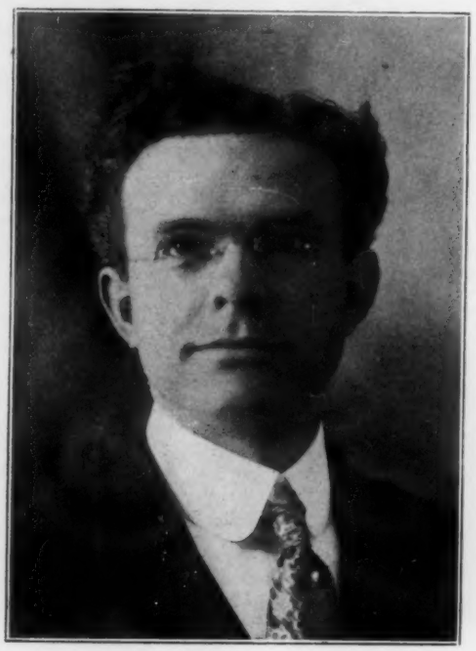
At the last meeting of the Southern Textile Association Bernard Cone, of the White Oak Mills, said in substance

Fig. 1. Y. M. C. A. Building at Kannapolis, N. C.

that the last decade was marked by great development of the cotton manufacturing industry, both in the enlargement of the industry and character of the product. This is a result for the most part of improved methods, improved machinery and better care of machinery. If the next decade is to see a similar development, and it must, it will be because we have improved the character of the human machines in charge of the frames and looms. This means improving the mill, home and village conditions by the introduction of welfare work.

Industry is not giving employment today, but is buying labor. The time, thought and discussion given to the purchase of machinery is being increasingly given to the purchase and preservation of labor; consequently industry is of necessity interested in the development of that which makes for efficiency, which means welfare work.

Anything that makes for better health, a quickened mind, clean social experience, and a Christ-like spirit is welfare work. The pictures to be shown in connection with this brief talk will tell graphically the type of welfare work carried on by the industrial department of the Young Men's



Dr. E. H. T. Foster.

Christian Association in the cotton mill associations established in the South and co-operated in by the mill officers everywhere.

All work is dependent on the physical body for its execution. Action is the watchword of life. Action is the product of muscular contraction. It requires strong muscles to do heavy work; trained muscles to do rapid and careful work; skilled muscles to carry out the suggestions of a trained mind and produce a costly masterpiece. A strong normal body is necessary to do efficiently life's work; sickness, disease, injury, unsanitary surroundings, improper care of the body, bad habits, etc., affect directly the working capacity and skill of the human machine.

At this time there is a certain amount of available help with which to conduct our mills. How important it is from all standpoints that good health should prevail, thereby leaving the maximum fit for work. An epidemic of disease causes great havoc with both the corporation and the operatives and great economic losses as well. Fortunately the diseases that cause greatest loss are preventable. It

*This address was delivered by Dr. Foster before the Southern Textile Association at Chattanooga, and was illustrated by lantern slides. The illustrations were so valuable in connection with the text that we have delayed its publication until a representative number of them could be secured.—Editor.

requires persistent welfare work on the part of us all to eliminate any one of these preventable diseases. Here are a few facts concerning these diseases. Typhoid fever demands 350,000 cases with 35,000 deaths annually with an economic loss conservatively estimated at $75,000,000. Diarrhœa and associate diseases were responsible for 56,000 deaths in 1908, 85 per cent being children under five years of age. Tuberculosis is responsible for one-tenth of the total deaths in the United States at this time. Fifty per cent of our young men are infected with venereal diseases, the final results are found in the asylums, in the hospitals for the blind and in immature graves. We are infected with these diseases through contamination. The disease germs are carried from filth to our food and drink. The fly is the carrier given credit for carrying the greatest amount of infection. By arousing public interest clean-up campaigns can be started together with "swat the fly" clubs, etc. This rids the community of fly breeding places and greatly lessens the ravages of these diseases. By stimulating flower and vegetable gardening in the community, dirt and filth will disappear and thus not only make for a clean community but an attractive one as well. By means of illustrated talks and demonstrations the value of screen doors and windows as preventive methods against typhoid and malaria, etc., and foul air as a cause of tuberculosis, colds and pneumonia can be shown.

The changing of Panama from a death trap to a health resort clearly demonstrates what sanitary methods persistently employed will do. The ravages of typhoid and kindred diseases among our soldiers during the Spanish-American war, strict sanitary measures not being employed, resulting in a death rate of 1,463 per 100,000 soldiers, as contrasted with the typhoid death rate among the Japanese during the Russo-Japanese war, where sanitation was enforced and the death rate was only 25 per 100,000 soldiers clearly demonstrates the possibilities of cleanliness and precaution.

Cleanliness, disinfection, quarantine and other preventive measures should be increasingly employed, but this is not enough to produce perfect physical welfare on the part of the individual.

The physical exercise received in doing the usual work of the factory, office, or mill, is not the kind that makes for physical development and healthfulness. During work hours poisons are being formed within the body and are not entirely cast off. As these accumulate the body is rendered less capable of work. It is a fact commonly known that we can do more work in the morning than in the afternoon. Students of scientific management tell us that as much or more work can be done in an eight-hour day as in a ten-hour day in some industries. This illustrates that efficiency is closely akin to physical well-being.

The gymnasium classes with their fast snappy exercises and recreative games, the outdoor sports in which running exercises predominate, raise materially the blood pressure by increasing the heart beat and respiration, thus the accumulated poison is flushed from the system. Many mill men and boys will testify to the benefit received from such exercises.

The cleansing shower bath, increasingly popular, adds elasticity and life to the skin and enables it to do its work of elimination and protection much better.

Frequent illustrated health talks do a vast amount of good in communities where promoted.

FIG. 3. Y. M. C. A. BUILDING AT THE MONAGHAN MILL, GREENVILLE, S. C

A strong, healthy body is only the first step to efficiency. Many a yoke of oxen have strong healthy bodies, but their usefulness is limited to drawing a plow or cart. The textile industry requires something more. Education is the next step. A healthy body with mind specially trained goes far toward efficiency.

Our cotton mill Y. M. C. A.'s are promoting night classes offering general and special courses. A man capable of reading and writing is more valuable to the mill and himself and family than one who cannot. One of several recent cases in which these classes put a young man in line for a 50 per cent increase in wages in four months' time proves this statement. To see men recently unable to recognize a letter reading the newspapers as a result of a short course in the night classes proves their usefulness.

Many mills have adopted the policy of promoting their own men to positions of authority such as second hands, overseers, superintendents, etc. The night classes dealing with the practical work of the mill hasten such promotions and render them less arduous to the parties concerned by

Fig. 2. Y. M. C. A. Building at Hartsville, S. C.

equipping the men with the practical knowledge they need in their work.

Such classes as designing and special calculations adapted to weaving and spinning problems not only make the student more efficient, but develop in him greater respect and interest in the textile industry—changing him from an automaton to a thinker. He mixes brains with his work.

A class of eleven studied designing at a Y. M. C. A. night school (course of thirty lessons) and of eleven six received promotion within four months. A member of another class writes, "The night classes at the Y. M. C. A. have made me ambitious. Since attending them I have been promoted from loom fixer to second hand. The desire to read cheap literature has been destroyed." Another writes, "I have worked in the mill fourteen years without taking any interest in my work. The good work of the Y. M. C. A. night school got me started. I was promoted from fixer to second hand, which position I held two years, was then promoted to a better job as designer. I cannot say too much about the night school." A weave room boss who is teaching designing and calculations in a Y. M. C. A night school said recently that were it not for the opportunity this class offers to instruct the men in his room about the problems that are daily arising he could not run the room satisfactorily. Another says, "I owe my job to the practical work taught at the Y. M. C. A. night school." To get men to think less about how to shirk a duty and think more about doing good work in the mill, they have to be put in line of promotion. Ambition must be fired within them. These educational classes go far toward lifting a man's horizon and making him feel that there is a chance for him to rise in the industry.

By adding education and especially that kind which

Fig. 4. Kannapolis Boy Scouts.

deals with the practical work of an industry a big step is taken toward efficiency. Our bodies are so constituted that we tire of doing one thing all the time and work soon becomes more or less automatic. This means that the higher power, the brain, that controls life and activity is less active. Monotony soon undermines a strong, healthy body and renders a trained mind less a factor in production. Monotony leads to dissatisfaction; dissatisfaction leads to

Fig. 5. Unimproved Mill Cottage and Yard.

Fig. 6. Boy's Gymnasium Class at the Monaghan Mill.

carelessness and inefficiency; carelessness and inefficiency soon lead to difference with the overseers which ultimately means that the family moves to another mill village.

It is necessary that the machinery in the mills be substantially built to withstand the strain; then, too, that it be built to do properly the work intended. So with the human machine. Health and education are necessary to

Fig. 7. When the Boys are Offered Prizes for Cleaning Up the Village.

efficiency. Machinery needs to be cleaned and repaired—re-created frequently. So with the human body. The stress and strain, together with accompanying monotony must be broken. Social activities play an important part in maintaining efficiency. The social instinct left to ramble undirected, in many cases soon undermines the physical and mental life, not only of the individual himself, but of his associates and the community as well, thus making for the wholesale destruction of efficiency. Rowdyism, immortality, drunkenness, about any industry increases the burdens of the overseers because it means trouble in the mill. A welfare program must include the promotion of healthful social life. Well selected moving picture entertainments, illustrated talks on various subjects, home talent entertainments, informal socials for various groups such as lodges,

Fig. 8. Garden Improvement One Year Old at Hartsville, S. C.

Fig. 9. One of the Prize Winners for Pot Plants at the Olympia Mills, Columbia, S. C.

Fig. 10. A Prize Garden at the Granby Mill, Columbia, S. C.

military companies, young people's organizations, gymnasium classes, a night school group, and the general public is promoted by the various cotton mill Young Men's Christian Associations with good results.

The machinery in the mill has been used as a simile up to this point. For efficiency the machinery must be strongly built; so must the human body that controls the machinery. Machinery must be built so that it will perform its part adequately; so with the human body, which must be educated and trained to do properly the work required of it. Machinery must be cared for and cleaned—re-created; so with the employees of an industry. Wholesome social life is necessary to neutralize monotony and its malignant results. With these requirements the efficiency of machinery is about complete. Not so with man. He needs something more. Unless efficiency is built on a character foundation it is liable to fall with any of the many industrial storms that prevail. Character is the foundation of efficiency, and religion is the Gibraltar of character. Therefore an adequate welfare program must include the development of the religious life of individuals. The Young Men's Christian Association is earnestly promoting men and boy's Sunday meetings, Bible classes and training classes. The secretaries are meeting men and boys face to face in personal council. These efforts are producing results.

The human man has accomplished wonderful things in

Fig. 12. Chadwick Mill Park and Gardens, Charlotte, N. C.

Fig. 11. Another Garden Arrangement at the Granby Mill.

the past. The future demands even greater things. Efficiency is the key. To be efficient man must be built four square, physically, mentally, socially, spiritually. This is welfare work.

CHILD LABOR LEGISLATION.

BY JOHN F. SCHENCK, LAWNDALE, N. C.*

We propose to discuss specific questions, such as Child Labor, Inspection, etc.; but first, we propose to consider the question of sumptuary legislation in a general way, and show the unfairness and uselessness of enacting any law in this state for the purpose of further restricting the rights and privileges of the manufacturers and their employees.

We challenge the active agitators of labor legislation to answer the following questions:

Just what "material aid" have they ever rendered to the North Carolina laborers, either on the farm or in the factories?

How much have they contributed toward building and maintaining, for these people, churches, school houses, and libraries?

How much have they contributed toward lengthening the school term in this state?

What new and better opportunities of any kind have they ever opened up to poor boys and girls in North Carolina, in order that they may become industrious, independent, and thrifty?

First: We assert that, in every free country, every person engaged in a useful and private business should be allowed, in the conduct of that business, the broadest liberty consistent with the public good; and before that liberty should be hampered or curtailed, it should, by a full and fair investigation, be shown beyond a reasonable doubt that the present prevailing method of conducting that business does more harm than good, and that legal interference is necessary for public protection.

We use the words, "Useful Business." We mean that kind which is doing more good than harm. We have no defense to make of a business which is a nuisance *per se*, and whose natural fruits are vice, immorality and idiocy.

Apply this reasonable and sound doctrine to our case. We operate in a free country. We are engaged in a useful business. We emphatically deny that our method of conducting our business is actually doing harm to society.

We thus establish a clear and square-cut issue between us and our assailants. If there is any doubt, we are entitled to the benefit of it.

We challenge our critics to produce convincing proof of the existence of conditions at our mills of sufficient prevalence and seriousness to justify legislative interference.

We invite an unbiased and thorough investigation to settle the issue here presented.

Second: We assert that legislative meddling, applicable to a whole class, cannot be justified upon the strength of a few isolated cases of wrong. Because, among a large number of mills in this state—most of which are up-to-date and well-managed—can be found a few pathetic instances to photograph, criticize, exaggerate, and weep over, is not sufficient excuse for invoking legislation calculated to injure, annoy and humiliate a respectable industry.

Again, we assert that almost all labor agitation is based on the false presumption that factory laborers are not free. Every professional social reformer is apparently anxious to create that false impression. After he has concluded his heartrending narrative of Southern cotton mill conditions, his too credulous audience, in their imagination, see shackles upon the laborers ankles and ropes about their necks. Factory employees in North Carolina are as free as any industrial class on earth—as free as the hired laborer on the farm, and freer than the farm tenant.

If they wish to go to another mill, the way is open. They are free as the air. What does all this migration from farms and mountain homes to the mills mean? It is simply a proof of freedom and a demonstration of a great law of nature, namely:

As lightning traverses the easiest path to the ground, and water travels the easiest path to the sea; so do all free classes of humanity seek their ultimate object of existence along lines of least resistance.

Thousands of poor families have thus been gladly deserting homes of squalor, poverty, hardships and ignorance; and have taken refuge in comfortable mill villages, where they can obtain employment which more easily feeds, clothes, teaches and refines. As they succeed at the mills, many are going on into better conditions in life. These people are winning the greatest success obtainable by them, along lines of least resistance, and this should be every laborer's inalienable right.

At the time of the passage of the Age Limit law, the prevailing practice, with both mill managers and parents, was to discourage the working of very young children in the mill, except in special cases where serious necessity on the part of the parent or the child required it.

Before the Sixty-Hour law was passed, the full time schedule of over 30 per cent of the mills of this state had already been voluntarily reduced to less than the legal limit of sixty-six hours.

The percentage of mills operating at night is, from natural causes only, very much lower than it was years ago.

Twenty-five years ago, before the South had recovered from the ravages of the Civil War, in a cotton mill, thirty cents a day was good pay for grown women, and fifty cents a day for grown men. The mill help had to live in shabby, unceiled hovels, entirely too small for comfort. They could not dress comfortably or nicely, and were destitute of con-

*Extracts from a brief prepared as chairman of the Legislative Committee of the North Carolina Cotton Manufacturers' Association.

venient church and school facilities. Yet they flocked to the mills to escape the more intolerable conditions that prevailed among renters and hired laborers on the farm.

Since those earlier days, up to recent years, the general condition of our mill operatives has greatly improved in every particular. Warm, roomy and nicely painted cottages being provided for employees; convenient churches and school houses, libraries and free schools being placed at their doors.

What was the cause of these improved conditions? Legislative interference contributed nothing. Such legislation was not, during the time, in existence in our state. Those changes for the better have come about as the natural result of an altruistic spirit and a healthy competition among the manufacturers. Untrammeled and wholesome competition among the manufacturers themselves has ameliorated the conditions of textile laborers, and added more to their welfare in the last twenty-five years than labor legislation can ever accomplish.

We sincerely and seriously claim that when social and business problems amicably and naturally solve themselves, legislative intervention becomes a tyranny, and is detrimental to the common good.

The cotton manufacturers of North Carolina, and of other Southern states, have been so busily engaged in developing a great and useful industry, and doing "welfare work" of a substantial kind, that they have thus far taken little serious notice of the warfare which has, for some time, been so persistently and systematically waged against them.

Hired agents, chiefly from without the state, are constantly at work advancing their unfriendly movement by means of lectures, circulars, and widely-scattered petitions.

The manufacturers of North Carolina cannot longer afford to treat this unfriendly crusade with silent contempt. In justice to themselves, they should correct the false impressions by which the minds of many people have been poisoned against them, and set themselves right before the public.

The fact that this child labor movement may have accomplished some things, seemingly good, in other states, is no conclusive proof of great and wonderful merit.

If one-tenth as much time and money were spent in behalf of the North Carolina manufacturers as is being used against them, the false impressions made concerning certain mill conditions could be so thoroughly corrected, and the truth as to our work so well established, that our industries would once more enjoy a season of peace and quiet.

It is the writer's individual opinion that the law in North Carolina, prescribing an age limit and applying it only to manufacturers, is unfair. Why should small children on the farm be waked at 4 o'clock in the morning, and be made to toil incessantly in the broiling sun, or compelled to drive wagons all day long while thinly clad, with their little hands and lips all chapped and blue from the winter winds? Why the long, dreary, and hard day's work which often falls upon the poor farmer's daughter, who goes with dew-bedrabbed dress and wet feet to the cowpen day and night, and helps hoe, and even helps plow the crops? We are speaking not of the well-to-do and independent land-owner, but of the poor tenant and the unfortunate tiller of the soil who is a victim of misfortune and adverse circumstances. Many of these poor families regard it as a godsend to be allowed to move to some good cotton mill and better their condition. Now we wish to ask a very significant question:

Why is it that, while those back-breaking and heart-sickening hardships are being endured by women and children of many farm and tenant families, we never hear a legislative murmur? The professional humanitarian sheds not a tear. The political demagogue heaves not a sigh. Then why is it that when these humble people move to the mills and find easier and more profitable employment, the skies fairly reverberate with lamentations on their account?

Who is most capable of deciding this issue? Surely not theorists; but those who have had the actual, practical experience—the women and children who have tried both conditions. Ask them about it! Although the way is open, seldom does a family voluntarily return to the conditions from which it emerged when it moved to the mill. This practical fact is better authority than a thousand high sounding and eloquent theories.

We know of only one potent reason for this great partiality; that is, the fact that the farmers cast at least thirty-two per cent of the votes in this state. They are a brave, liberty-loving people; they quickly resent encroachments upon their private rights; and somebody or other is afraid to tamper with Mr. Farmer's business!

Mill managers do not encourage the working of young children. For the sake of large production and superior quality of goods it is no economy to employ them. Parents, as a rule, do not insist upon mills working young children. They usually prefer to send them to school when possible.

Dr. Wilkins, the physician who recently expressed his views in the Charlotte Observer, was correct when he stated, in substance, that age should not be the only criterion by which to judge whether a child is fit to work or ought to labor.

It has remained for a certain modern school of philosophers to organize a crusade against work. They fail to grasp the patent fact that it is not work but idleness that threatens our civilization. The nation should feel more apprehensive about its indolent rich than its hard-worked poor.

The working habit should be formed very early in life. It will be worth a thousand times more than the mean habits generally acquired by children who are strangers to work. If a child is large enough to work, it is far better, when he is not in school, to find him systematically employed alongside of other industrious workers, than to find him constantly associating with cigaretre smokers and loafers.

If "reformers" have nothing better for poor children than to prevent them from earning an honest living along lines of least resistance, the children will be better off without their misguided efforts.

"All nature is teaching us gospel of work. When a man runs away from work, he runs away from life. He ceases to be a man and becomes a parasite—if at the lowest end of society, a loathsome vagabond; if at the other end, a lily-handed, lavender-scented cane-sucker. And neither is worth to the world the powder and shot it would take to kill him."

The manufacturers of this state not only profess an interest in child welfare, but they *practice* it. They are especially interested in the educational idea. As evidence of it, we point to the excellent schools which are built and maintained by most of the mills for the benefit of their employees' children, and especially to the resolution of our association endorsing compulsory education. Why not by law compel every child, whether at a factory, on a farm, or in a city, to attend school regularly?

Instead of appointing a state official to the disagreeable and mean task of invading and inspecting every manufacturer's mill, local officials in every county should be selected to enforce the education of every man's children, regardless of calling, occupation, or condition.

This will solve the child labor and the inspection problem so far as it needs solution by the General Assembly.

Those who profess that they are divinely called and sent into this world for the express purpose of regulating the private affairs of others, could not advocate a more timely and valuable law than one to stop the idle sons of the wealthy from prowling the streets, and put them at regular work in some cotton mill; one that would stop many of them from running automobiles and put them to running looms. Our factory children can easily and joyfully dispense with their assistance—their missionary spirit is needed at home.

In conclusion, we wish to lay stress upon the fact that this is no fight on our part simply for dollars and cents. We resent further intrusion upon our private rights, chiefly because we assert, believe, and *know* that the conditions in our business do not call for or justify it.

The cotton milling industry of North Carolina has given this state its second life and growth. It has not only been the industrial salvation of our state, but has relieved the stress of grinding poverty throughout this section, and in every way elevated our average citizenship.

FIREPROOF CONSTRUCTION IN REINFORCED CONCRETE.

There appears to be a general lack of knowledge of the rapid development of the important features which enter into fireproof construction whereby its cost has been materially reduced. It costs only about 10 per cent more to build a structure in which the fire hazard is practically negligible, than one of the slow burning type. Although the cost of thoroughly fireproof construction as provided by reinforced concrete is naturally somewhat greater than that of ordinary construction its durability and its exemption from fire risk greatly reduce the net annual charges.

The advantages of reinforced concrete as a fireproof material are well set forth in a paper presented before the National Fire Protection Association, by Leonard C. Mason, president of the Aberthaw Construction Co., of Boston, from which we quote in part:

"Numerous fire tests have been made to determine both the resistance of concrete to actual tests and also the depth to which the reinforcement must be embedded to prevent its being damaged. The maximum depth of pitting observed by the writer in actual fire tests where a temperature of 1,700 degrees F. or more has been maintained for a period of five hours, has been in either walls or ceilings one inch to one and one-half inches. Also by the examination of actual conflagrations, such as that at Baltimore, and elsewhere, it has been apparent that the pre-arranged fire tests are more severe in the results shown by the structure than actual conflagrations. Therefore if we can protect the materials against damage in a pre-arranged test, they will stand any actual service. The consensus of opinion of engineers is that there should be at least one inch of concrete between the nearest point of a bar to the ceiling in panels, at least two inches of concrete outside the vertical bars in columns. In designing columns it is common to figure only that area of column inside the vertical bars when hooped as carrying the load, or if hoops are omitted and but light reinforcement is used to prevent bending stresses, to add an extra inch beyond that needed to carry the load all around the outside, which might be burned away without endangering the load carrying capacity of the balance of the column within. If this is burned off it can be plastered back, giving the column the same fire resisting qualities as before.

"The other types of fireproof construction which are coming into competition with reinforced concrete are structural steel encased in concrete, and this when thoroughly encased from a fireproof standpoint is similar to an all concrete building; structural steel frame encased in terra cotta, and to a small extent plaster of paris and brick have been used in fireproofing steel, but not to a sufficient extent to be worthy of much comment. Thoroughly well laid brick work is a good protection to columns, but when cast as arches between beams it leaves the bottom flange exposed, which is a serious defect. Actual conflagrations have conclusively shown that terra cotta is not so perfect a fire protection as concrete. This is largely in the writer's opinion, due to the fact that its coefficient of expansion is high so that it expands to such an extent that when confined between the beams it is crushed, the lower member falling and thus weakening the floor. It is also more susceptible to a combination of fire and water, being to some extent brittle and cracking when a cold stream strikes a hot surface.

"Before concrete will disintegrate when exposed to fire, the large amount of moisture chemically combined in the setting of the cement being 20 to 25 per cent of its weight, has to be driven off by heat and then the vapor thus driven off has to be evaporated from the pores of the concrete before it becomes sufficiently hot to crumble. The slowness of evaporating this vapor is probably the cause of concrete resisting extremely high temperatures for the brief period of a few hours, while a much lower temperature, if long continued, would ultimately disintegrate it. Cement will resist 500 degrees F. for an indefinite period while a continuous temperature of over 700 degrees F. is disastrous. The cement coating of the stones of the concrete will resist the attack of fire so long that it is of less consequence whether the stone can be damaged by the fire or not. Thus pure limestone is a most excellent aggregate and will not decompose until after the cement has, and after the cement has gone it is immaterial what aggregate is used, as the work has then failed anyway.

"Regarding the cost of this type of construction as compared with others, the large use has proved conclusively that it will compete, because the item of cost is considered paramount in 99 out of every 100 structures. For large buildings the structural frame is almost always cheaper than the steel. Thin curtain walls cannot be built as cheaply on account of form work, which is constant for a thin wall as well as for a thick one, but if the wall must be sixteen inches or more in thickness concrete is cheaper than brick."

An interesting announcement has been made of a Japanese invention for treating straw in such a manner as to give it a soft wooly feel. It is the intention to use this material as a batting or wadding for heavy cloths, quilts, etc. Why would this idea not apply equally well to rice and other straws produced in this country?

Mill Conditions and Market Reviews.

SOUTHERN MILL SITUATION.

(*Special Correspondence.*)

The manufacturing interests of the South have been more interested in the doings of the political world for the past month, than in any other matter that the industry is concerned in. As yet, too, this interest is unabated, and will continue in its present state until the extra session of Congress, which has been called to meet on April 7th, shall have taken action on the cotton tariff. It is worthy of comment that President Wilson, in his call for the extra session did not give any other reason for the call than that public interest demanded it, nor did he give any ideas as to what his message would be, though it is generally conceded that it will deal almost entirely with the tariff. There seems to be very little fear shown among the Southern manufacturers that the schedules will be so cut that they will work an injury to the mills of the country. The Hard Yarn Spinners Association of the Carolinas at a meeting in February, at Gastonia, N. C., did adopt resolutions in which they expressed themselves as opposed to a reduction on the yarns which would put our labor in competition with the starvation-wage-operatives of England. Especially did the resolutions of this Association refer to the yarns used in manufacturing laces, towels, carpets, and upholstery purposes.

The American Commission has been appointed, and will sail from New York on April 26th to visit a number of foreign countries in the expectation that the ideas and methods thus learned will be of material value to our manufacturers, bankers, etc. The conditions of the countries will be investigated as to the labor conditions, manufacturing and marketing systems, banking and currency conditions, etc. The American Cotton Manufacturers Association has appointed James P. Gossett, of Williamston, S. C., and the S. C. Cotton Manufacturers Association has appointed E. F. Woodside, of Greenville, S. C., to represent their respective associations on this trip, which will extend over four months time.

A child labor bill was finally passed during the last few days of the Legislature in North Carolina. Under the new law no child under 12 years of age may be employed, while no child between 12 and 13 may be employed except in an apprentice capacity and then they must have attended school for four months during the past year. No person under 16 years may work in a manufacturing establishment between the hours of 9 p. m. and 6 a. m. The county superintendents of public instruction shall be the inspectors and see that the provisions of the law are upheld.

A legal decision of interest was handed down last month in favor of the Proximity Mfg. Co., of Greensboro, N. C., in connection with a contract for waste. The Proximity Company had a year contract with W. Wolfe & Sons, of Boston, by which the latter were to buy the entire waste product of the mills. At the end of the year there were 580 bales which they had refused to pay for, claiming that it was inferior quality. The mills claimed that it was of the same quality as that already purchased and that it had been produced as had the other. A verdict of $832 was handed to the mill.

The South will be interested to see if the appointment of Dr. Charles P. Neill will be confirmed by President Wilson for the position as Commissioner of Labor. Dr. Neill was in this position last year and caused the investigation into Southern mill conditions and life which has caused a great deal of press comment and injustice to this section of the country for the gross misrepresentation. It is even claimed by one of the investigators that because his report showed to the advantage of the Southern mill life and that it proved that a family was better provided for in the mill village than in their mountain home, his report was rejected and not incorporated in the report of the Committee. It is pretty generally hoped in the South that the appointment of Dr. Neill will not be confirmed.

Indications now point to a large cotton crop for the coming season. There have been heavy demands on the fertilizer plants and this is always taken as an indication of what is going to be worked into cotton by the farmers. Prices have held up so well during this entire season, and the fact that the demand is still heavy with a very light hold-over has again influenced the farmer to put another large section of his place into the staple. Prices have not weakened during the past month, the level for spot being about 12½c. The census report on the consumption for February shows that 466,933 bales were consumed, as against 533,933 bales in January.

Knit goods manufacturers are in the strongest position as regards the markets, a condition that has existed for several months. There is a steady demand for knitted goods of all descriptions, while prices have maintained a good level. Manufacturers are often unable to give the deliveries wanted and will not take orders for balbriggan now for delivery short of June and are holding their goods at advances. This situation has been brought about by the fact that a year ago the duplicate demand for goods was so late coming in that the mills were kept busy until late in the season supplying it, they were then late in beginning the Spring deliveries, and have as yet not caught up with the demand. This has put the mills in control of the prices and they are not taking orders at any concessions.

The conditions are almost the reverse in the yarn situation. Here the prices have been going downward, while business has been for small spot lots mostly. Some spinners are holding their goods for prices above the market quotations, but many of the buyers are holding off because they believe prices will ease off more yet before they strike the bottom.

While little more than duplicating the above can be done in speaking of the conditions in the cloth market, it is worthy of mention that many of the mills are handling their plants in a conservative fashion. Buyers have been holding off, buying only what they had to have, and always looking for the lowest prices. They yet believe that prices are high to what they will be, and they are staying out of the markets except for small spot lots. Agents have advised the mills of the situation and as a general thing where there is no order to supply the mill is holding off on its production so that there will be no large stocks that must be disposed of should prices get lower.

While, as a general statement, it might be said that mill building progress has been quiet in the South during the

past month, it will be necessary to take into consideration that there have been a large number of the mills which have added new machinery. Many mills are having their plants overhauled, old machinery thrown out and new put in its place, and an even larger number are increasing the equipment by the addition of new machinery. Altogether, while there is practically nothing to report in the way of new mills, the month has denoted progress in mill construction circles.

It might be stated that nearly every mill plant in the South is today running full time, and that many of those which are able to secure sufficient help, are running their plants both day and night.

The Blanche Hosiery Mills, Chapel Hill, N. C., was incorporated at $100,000, as also the Memphis Cotton Mfg. Co., Memphis, Tenn. It is stated that new mills are being considered at Headland, Ga., Royston, Ga., Lawrenceburg, Tenn., Terrell, Tex., and that the Poe Mills, Greenville, S. C., are considering the erection of another mill.

NEW ENGLAND MILL SITUATION.

(*Special Correspondence*).

Trade quieted down in the latter part of March and the complications of a tight money market and an impending change in the tariff were sufficient to account for the conservatism prevailing in selling circles. There is still a substantial business on the books and the mills have enough to keep them busy for some time to come. It seems to be a situation where the mills can sell their product about as fast as it is made, but they are unable to sell it in substantial quantities to be made.

The financial disclosures toward the end of the month were distinctly unsettling. Many of the banks in mill centers and in Boston hold paper of the United States Finishing Company, on which a six months' extension has been asked. Many of the mills have sold goods liberally to William R. Moore & Company, of Memphis, Tenn., who are now in the hands of receivers, but who bid fair to pull through satisfactorily. The failure of G. A. Stafford & Company, a New York dry goods commission house, did not affect New England mills directly to any extent. The combination of all three of these troubles in the third week of March naturally disturbed conditions, and until April settlements are made it is expected that quiet will prevail.

The finishing companies have not been getting all the business they can handle, but they are far from running light, and they speak as a whole very favorably concerning the prospects of lines to be finished for fall. There is activity enough in the fine specialties and novelties, but a limited measure of business in the staples.

Lines of percale for fall have been opened by the large printers and trading has been going along in very satisfactory volume. Prices named on 4-4 80 squares were reduced 1-4 cent a yard by one printer soon after the opening, and no protection was given. The jobbers of the country appear to be accepting the difference of 1-4 cent a yard as a fair average to pay for protected as compared with non-protected cloths. Business on narrow prints has been generally quiet. The printers are getting good fall orders on draperies of all kinds and the new offerings show the widest patterns and color range yet offered in this country.

Business on ginghams has been of moderate proportions only. The business on the books is taking care of the output of the large mills on the 10 cent retail lines. Trade is slow in the better grades, more particularly in the 27-inch, 15 cent and 25 cent retailers. There has been a good trade in blue shirting chambray for the cutting trades and the leading lines are under order for fall. Some of the new yarn bleached madras has sold very well and it has doubtless become a staple article.

Bleached cottons have held steady on a basis of 8 5-8 cents for Fruits and around 6 cents for 4-4 64's. Trade has been about active enough to take care of the product. On some cloths this would not have been possible if some fair forward business had not been on the books when March opened. The finer grades of carded goods and the best grades of bleached lawns, linons, etc., have not sold satisfactorily, although mills have not been forced to sell at a loss. Longcloths, the better grades of nainsooks, and some of the bleached specialties have moved out steadily.

The large blanket and napped goods mills have a substantial volume of business booked for fall. On the fancy jacquard blanket lines jobbers are already showing interest in having prompt deliveries for fall distribution. The cutting trades are very anxious for additional deliveries of wide flannellettes for the pajama trade and for many of the lines of children's garments made ready to wear. There seems to be no question concerning all orders holding because of the known close clean-up of stocks in jobbing houses at the end of the last fall distributing season.

All lines of coarse cottons made in this section are apparently under order for the next 60 days at least. In many instances orders are in which will not be completed till late next fall. All grain bags, crash towelings, heavy double and twist denims, standard and fancy tickings and specialties in fancy duck and working suit materials running to 17 1-2 cents a yard are bespoken for some time. Immediate demand is inactive on most of these lines, but the past trade has been sufficient to provide a substantial outlet for coming products.

Early in the month it became known that a few mills had booked a substantial contract business on India linons and 40-inch lawns for future delivery to a few of the largest converters. This action provided a solid foundation on which fancy goods contracts are now being placed principally on goods to be delivered up to September. The change in fashion whereby jacquard patterns are in active demand in all lines of fabrics has enabled leading mills having jacquard looms to sell up profitably as far ahead as they would intimate a willingness to book business. As a matter of fact, some mills having jacquard looms are booked ahead for the balance of this year.

The demand for fancy cottons of all kinds has been far and away ahead of the relative demand for plain fabrics. It is already apparent that the coming fall season will be like the current spring—a season of exceptional demand for fancies. Ratines, crepes, voiles and piques, in plain and fancy effects, have been selling on the markets and are being reordered for spring and fall. One of the new fabrics that bids fair to have a permanent place is the jacquard poplin, a figured cloth on the serviceable poplins that have been used so largely in recent years.

Mills have been compelled to restrict the sales on many fine novelty cloths through an inability to secure the weavers required. Already the scarcity of weavers is pronounced in most of the large centers at a time when they should be most plentiful. It is feared that if there is no surplus of

operatives now the conditions will not be bettered in the spring.

There has been some agitation in trades union circles with a purpose in mind of furthering unionism outside of New England. An effort has been made in some quarters to create the impression that this movement is fostered by manufacturers. There is absolutely no basis in fact for such a conclusion. Cotton manufacturers have expressed a desire to see the old-established trades unionism, based upon the Lancashire type, make progress in New England with the socialistic I. W. W. type, but in this they are endeavoring to look after their own troubles and allow others to make their own way with theirs. Persistent attempts are being made to add to the I. W. W. influence in New England, but it is felt that the struggle at Lawrence a year ago, followed by the failure at New Bedford in mid-summer, ended any chance such an anarchistic organization had in this section.

A new tariff bill will probably be reported about the time this is printed. Whether it will be a duplicate of the old Underwood bill on cottons or be a modification of that bill such as that presented by the American Cotton Manufacturers' Association is a matter of large consequence to New England mills. Under the Underwood bill many mills cannot profitably produce fine goods in competition with the mills of Lancashire in the average of the years. At the present time they could possibly break even on straight plain fabrics under 60's warps.

If the so-called Parker bill is adopted it is admitted that the chances for the fine and fancy mills will be somewhat better, but it must not be understood that there is any enthusiasm anywhere on the proposed bill. The chief objections are to the *ad valorems* and to the absence of specifics on the cloths into which labor costs enter largely. The assumption that a protection of 35 per cent on many fine fancy cloths is sufficient to induce large production here is wholly gratuitous and not based on the previous experience of men who have assisted in making tariffs for many years.

No formal objections will be made to any bill until there is a reasonable degree of confidence in the ability to offer something in the way of a compromise that will merit assistance from protection democrats and progressive republicans. At the present moment there is little hope that anything better than the Underwood bill will come from the Ways and Means Committee.

Machine shops are moderately busy, but additions are being made principally in the South. No large investment is looked for until the tariff bills are passed.

COTTON CROP CONDITIONS AND A REVIEW OF THE MARKET.

(*Contributed Exclusively to* COTTON.)

BY H. AND B. BEER, NEW ORLEANS.

As yet there has been no improvement in the foreign demand for American cotton, exports to Europe, which, up to one month ago were 850,000 bales less than last year, are now about 1,700,000 bales smaller than they were to even date one year ago. These conditions are attributed to unfavorable political and financial matters abroad, the result of the continuance of the Balkan war.

Meanwhile the movement to market has continued on a restricted scale, and although this commercial crop promises to be only about 14,500,000 bales against 16,138,000 last season, the South now holds about as much cotton as was held in the South at this time one year ago, or say about 2,500,000 bales.

It can readily be seen, therefore, that there is to be no scarcity of cotton this year, and now that the prospects for the next crop are commencing to receive consideration, the question is will the South be able to market the unsold portion of the old crop except at prices lower than those now prevailing. This feature of the situation will be governed by new crop prospects.

If the weather for the new crop should prove favorable, the market in all probability will decline, but if unfavorable weather is experienced, prices are apt to be maintained, perhaps work higher. At the moment the outlook for the new crop is favorable, for while preparations are a little backward east of the Mississippi compared with the normal, they are far ahead of last year, and were never more promising in the Southwest, particularly in Texas.

Sales of farm implements, livestock and fertilizers are said to be of record breaking proportions, a large increase in the acreage is talked of in all sections of the belt, especially in Texas and Oklahoma, and as there is a good season in the ground, present prospects in all districts could hardly be improved upon.

In the meantime European trade conditions do not improve, the situation on the Continent being unfavorable owing to the unfavorable monetary situation and political conditions in Europe generally. In the United States there is room for improvement in the textile business, and the tariff question is having an unfavorable effect on business generally, especially in industrials.

During the past week the United States Census Bureau made final report on the quantity of cotton ginned and to be ginned from the growth of 1912, linters included. The following being the comparatives for this season and last season:

Year—	1912	1911
Alabama	1,366,428	1,735,951
Arkansas	803,071	939,850
Florida	60,033	96,426
Georgia	1,887,466	2,874,608
Louisiana	391,437	399,418
Mississippi	1,048,034	1,215,784
Missouri	56,065	95,336
North Carolina	934,420	1,156,407
Oklahoma	1,054,857	1,055,798
South Carolina	1,257,708	1,729,135
Tennessee	289,504	458,842
Texas	4,886,415	4,297,248
Virginia	25,485	31,099
All Other States	15,516	23,447
United States	14,076,430	16,109,349
Round bales	81,528	101,554
Sea Island	73,641	119,293
Linters	605,704	556,276
Avg. gross weight	507.8	504.4
Ginneries operated	25,267	26,349

According to the Bombay Gazette, the Indian cotton industry, which dates from 1851, "now claims 215 mills containing 84,627 looms and 6,246,975 spindles. Of this number, 105 are exclusively spinning mills, 19 exclusively weaving, while in 126 both spinning and weaving are carried on."

THE KNIT GOODS MARKET.

The knit goods market for the past month opened up with apparent quiet as far as any outward evidence of buying was concerned, but the heavy spring business booked by the manufacturers and the late start of some of the mills, when added to reduced hours of labor in certain parts of the country, tended to impede deliveries and made a situation that was adifficult one for mill managers. In the staple balbriggans, the initial business booked by many mills was larger than usual, and buyers as a rule showed a persistent desire, not only to secure prompt delivery, but in many instances to anticipate them as far as possible. The reorder business in these lines was also good and began early. The market on low end balbriggans at this period showed about 5 to 10 cents higher than the opening of last year. The situation on fall business was more easy.

As the month wore on, duplicate orders in sweater coats for next fall began coming forward in a most satisfactory manner, according to many large manufacturers. The ruff neck styles, somewhat modified so as not to be so heavy, hold the first position with the buyers this year. Much interest was also being shown in the older V neck type. There is considerable complaint that jobbers are forcing more additional items into their contracts that tend to increase the cost, such as colored labels, bands and woven hangers, and similar knic-knacks. The demand for light-weight underwear has proved so strong that many manufacturers of standard lines on which prices are generally uniform, have been seriously thinking of making advances on business taken for late months. The new labor law is affecting a number of the New York state mills, and it has been found that production cannot be maintained without an increase in help.

As the month closes, it becomes more and more evident that the cheaper qualities of ladies' union suits are scarce and in many lines of summer underwear buyers are finding they cannot get the goods they desire and they are many times finding it necessary to change to other makes or even take seconds. This scarcity so far applies only to ladies' summer union suits of approximately 50 cent quality and to the cheaper mesh goods for men. These goods have been advanced by the mills, but the orders were firmly maintained. In other lines of summer underwear there is a steady call for delivery and many requests for anticipation. There is no definite news as to the tariff action on knit goods and much interest is being felt through all lines of the industry as to the outcome. The hosiery market has not been marked by any considerable activity and very little new business was booked. Duplicate orders for spring goods in fine gauges have not begun to arrive in any large volume, but when the weather becomes more settled, it is believed that the usual spring business will materialize. The early business was so large in bulk that it has been sufficient to keep the mills busy, and they are due to be busy for some time to come. Children's hose in cheaper qualities are largely in demand, and orders for half hose in plaited silk to retail at 25 cents have, if anything, been in advance of expectations. Manufacturers of staple goods have orders so well in hand that very little remains to be sold during the balance of the year. Taken as a whole, the knitting industry still continues to show steady signs of prosperity.

THE YARN MARKET.

While February was a month of hand to mouth buying, March has shown little improvement although prices softened considerably during the middle of the month. Early in the month the hand to mouth policy prevailed among a greater number of buyers and with many knitters a scarcity of help had much to do with placing the orders. Seamless carded yarn hosiery was well sold but yarn prices remained irregular with a little occasional stiffening in the prices of 24's for spot delivery. Combed, two ply yarns were in light demand and some dealers said that the demand for this yarn was far below normal. There was a moderate demand for the higher grades of single yarn, sales of 5,000 to 10,000 pounds were made on the basis of 28½ for 10's eastern yarn. There was very little demand for mercerized yarn. It was reported that some spinners who needed the business were making price concessions, while others were holding for a half cent more than the market price. The cotton situation during this period was a puzzle to some of the yarn dealers. Some dealers claimed that cotton was hard to sell and that spinners were all covered until July, and some had sufficient to last them until new cotton comes in. On the other hand holders of spot cotton in the South are firm in refusing all offers that fall under what they considered a fair price.

As the month wore on, dealers were somewhat divided as to the volume of new business being put through. The demand for knitting yarns for both spot and future delivery was fair and some sales of 25,000 to 100,000 pounds were made. Prices were rather irregular and with a softer tendency. Both Eastern and Southern spinners were seemingly willing to make slight concessions in prices in order to get business. Deliveries on old contracts were good, but there seemed to be no accumulation. There was a good steady demand for 24's and 26's cones for spot delivery. The 24's were held at this time at 24 cents and the dealers wanted 24¼ and 24½ cents for them. Except in a few instances however, knitters were unwilling to pay more than 24 cents. There was not much demand during this period for fine combed yarns and dealers were pushing for business and in many cases willing to make concessions to get it. Some dealers sold 40's two ply combed peeler lisle for 41 cents, but the next lowest price was 44 cents. Sales of 5's two ply was made for 46 and 47 cents, while 60's two ply brought 55 and 56 and 58 cents. 80's two ply sold for 73 and 74 cents. Single combed peeler was in better demand than the fine two ply. In the New York market the prices continued to show a downward tendency. Some inquiries came forward from knitters on yarns which would be needed for spring, 1914, lines, but it did not seem at all likely that the business would be put through. It was reported that 10's Southern frame cones could be bought at this time on a basis of 20¾ cents.

The latter part of the month was fair in spots and dull in others. Fairly large sales were reported in some instances but prices were rather irregular and the general tendency seemed to be downward. When buyers were hard pressed for yarns for immediate needs, prices were very firm, but when the seller was looking for a buyer prices were soft. Manufacturers of light weight underwear were the largest buyers. This resulted in an unusual demand for 24's and 26's on cones. Prices ranged from 23½ cents for late deliveries to 24½ cents for spot, and the general price for quick delivery was 24 cents. While the demand

for 26's was not as pressing as for 24's, some manufacturers bought them whenever they could get them and others bought 28's in place of 26's. Sales of 26's was made for 24½ cents and 25 cents, while 28's sold for 25½ cents. The demand for combed yarns, both single and ply still remains light, and there is if anything a falling off in the demand for single yarns as compared with the earlier weeks of the month. The underwear trade brought some 24's and 26's and the hosiery trade brought 18's.

Spinners of the finer two-ply combed yarns report that they are not in need of immediate business and some of them will not have their contracts completed until August and September. There are others however, who undoubtedly do need the business. This is evident because prices are being cut from time to time. Spinners who a month ago were quoting 60's two ply at 60 cents are selling small quantities for 56 and 57 cents, while 40's two ply on cones sold for 40 and 41 cents. 70's two ply brought 65 cents and 50's two ply 46 cents. Dealers were quoting 80's two ply at 77 and 78 cents, and occasionally dropped off to as low as 75 cents, but orders at this were scarce. Mercerized yarns remained about the same as earlier in the month. 80's two ply mercerized was selling at 90 cents. Weavers continued to buy from hand to mouth and prices on warps have been gradually growing lower. Earlier in the month 40's two ply warps sold for 37 cents and were later quoted at 35 and 36 cents, while one sale has been made at 34 cents. There are many strikes pushing their storm clouds up on the horizon and the union agitators are in many instances doing all in their power to forment more trouble and bring these strikes to a head. The shadow of these labor troubles which will be very much accentuated if Congress insists upon passing the Sunday civil appropriation bill as it was recently amended, thereby excluding labor unions from the action of the Sherman law, and the possibilities of adverse tariff regulation all tend to cause a hesitation in the market at the present time.

Following are recent quotations in the Philadelphia market:

Southern Single Skeins.

4s to 8s	19	@19½	16s	21½	
10s	20	@20½	20s	22	
12s	20½	@21	26s	24	@24½
14s	21		30s	26	

Southern Two-Ply Skeins.

8s	19	@19½	24s	24	@24½
10s	20	@20½	26s	25	
12s	20½	@21	30s	26	
14s	21	@21½	40s	35	
16s	21	@21½	50s	42	@43
20s	22½	@23	60s	50	@52

Carpet and Upholstery Yarns in Skeins.

8-4 slack	20½	8-3-4 hard twist	18½@19
9-4 slack	20½		

Southen Single Warps.

8s	20		20s	22	
10s	20	@20½	24s	23½	
12s	21		26s	24	
14s	21		30s	26	
16s	21½	@22	40s	35	

Southern Two-Ply Warps.

8s	20		24s	34½	
10s	20½	@21	26s	25	
12s	21	@21½	30s	26	@26½
14s	21½	@22	40s	35	@35½
16s	22½		50s	43	@45
20s	22½	@23			

Northern Two-Ply Carded Peeler Skeins.

20s	25½		36s	34	@34½
22s	26		40s	39	
24s	26½		50s	44	@45
26s	27	@27½	60s	49	@50
30s	28				

Two-Ply Combed Peeler Skeins.

20s	29½		50s	47	@50
24s	30½		60s	55	@58
30s	34		70s	68	@70
40s	40	@41	80s	73	@76

Single Combed Peeler Skeins.

20s	29	@29½	40s	41	
24s	30	@30½	50s	45	@47
30s	34		60s	55	@57

Southern Frame Spun Yarn on Cones.

8s	20		18s	22½	
10s	20	@21	20s	23	
12s	21	@21½	24s	23½	@24
14s	21½	@22	26s	24	@24½
16s	22	@22½	30s	25½	@26

MILLS AND LABOR LAWS.

Under the above head the *Charlotte Observer* comments on child labor conditions, as follows:

"What Mrs. Carter has written thousands of people know, and any one who does not know but feels sufficiently interested can confirm. Women and children may toil their lives away and nothing is said; the moment, however, they enter the cotton mill to perform work about as light and unexacting as can be had anywhere we hear talk of 'child labor' and 'slaves of the mill.' It is absolutely beyond question that the health of the mill people has improved vastly beyond what the people whom they left behind in their own former status enjoy. They work far less hard, they eat better food, wear better clothes, enjoy social and educational and religious advantages better by a very great degree. They and their employers favor compulsory education. On the other hand, it is notorious that the difficulty about getting the great mass of North Carolina children in school even four months in the year is that they are kept at work. They must help prepare ground in the spring, pick cotton in the fall and help generally almost all the time. They work long and hard at ages when no boy or girl is permitted by law to do even the lightest odd jobs, allowing about half the time for play, around a cotton mill. And yet not only have we no agitation to protect them from hardship but we are regulating our legislation upon school questions with the express object of not letting school interfere with their toil.

"This paper is as zealous as anybody for improving the condition of the people on the farms and for further improving the condition of the people in the mills. It has nothing but kindness and good will for all who will assist toward these ends; and it will not permit itself to become impatient with anybody, as Mrs. Carter and others have done. But it does ask that zeal be tempered with knowledge and insight, that much more harm than good may not ensue. Why, in the mill business alone, should the boy or girl be entirely kept from useful occupation and the learning of a trade, whose possibilities are unexcelled? Except, perhaps, a provision for compulsory education, there is no occasion whatever for any change in the law governing employment in mills."

Argentina annually imports about $30,000,000 worth of cotton goods; Uruguay about $5,000,000, and Paraguay about $1,000,000. Argentina is importing today over a fourth of all the cotton goods imported into South America. It is perfectly ridiculous to say that we cannot break into this market, because Germany, Italy and Spain have all done so within the last twenty years, seriously endangering the former monopoly of a few large English houses, who were practically all exporters' agents or large English concerns. No wonder Argentina is today England's seventh greatest customer for cotton goods.—Charles Lyon Chandler.

The total number of operatives employed in the Bombay cotton mills increased from 102,775 in 1910 to 104,195 in 1911.

COTTON MANUFACTURING.

COMBERS AND COMBING.

(*Contributed Exclusively to* Cotton)

BY WM. SCOTT TAGGART, M. I. MECH. E.

PART TWO.

The general section of the Nasmith's comber, given in the previous article, can now be dissected and its various parts illustrated and explained together with a few remarks on the setting.

The upright lever arm H, Fig. 3, pivoted at J is attached by adjustable links M to a lever L keyed on the nipper shaft K. The shaft K is given a reciprocating motion, so that the upright lever H partakes of this to and fro action. The nipper plate D and the feed roller B being carried by the upright arm H and also moved forward and backward through an arc of a circle. The nipper plate D is fixed on a bracket or nipper bridge bolted to arm H and can be adjusted by screws, as shown in Fig. 5, at 13. The links M are attached to H at N. The distance of the nipper plate D from the cylinder or needles is under absolute control and there is no possibility of this plate coming in contact with the cylinder.

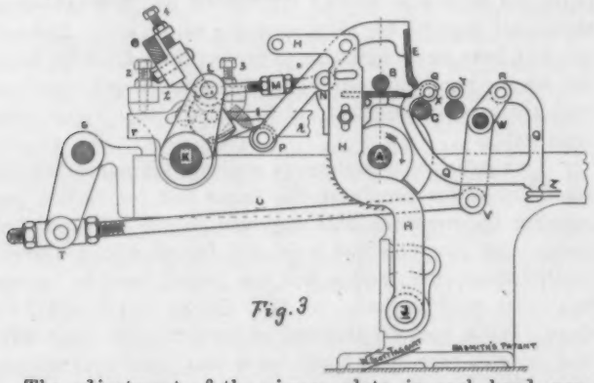


Fig. 3

The adjustment of the nipper plate, in each head, perfectly parallel to the detaching rollers, is obtained through the nuts on the connecting links M; very careful setting is of course essential in this, in order to have every nipper in the comber exactly alike, otherwise the combed slivers from the heads would be variable in weight and cleanliness.

When the nipper jaws are all correctly set parallel, no further adjustments is ever necessary so far as the links M are concerned, but the distance of the plate D from the detaching roller on all the heads can be regulated by set screws 2 and 3 on the crank motion that operates the nipper shaft K, see Fig. 6. This crank motion may be considered the central action of this comber so an examination of Fig. 6 will be interesting.

A is the cylinder shaft, and on it is a disc or index wheel containing a slot for the stud "6" which stud is the center for the slide carrying the slide bar "r." This slide bar is formed in two parts, "r" itself rests on the nipper shaft K and is bolted at "5" to a plate "t" which is keyed to the shaft K. The plate "t" carries two adjusting set screws, "2" and "3," and as they bear on the slide bar "r," their manipulation will bodily advance or move backward on the shaft K and consequently the lever L keyed to it. As the shaft K passes through the full length of the comber, all the nipper jaws are simultaneously adjusted as to their distance from the detaching rollers.

The movement itself is interesting as applied here. The various positions are marked on the drawing (Fig. 6), and it will be noticed that there are two distinct movements. From the first position to the third position, the nipper plate and feed roller move backward, and this is done in a

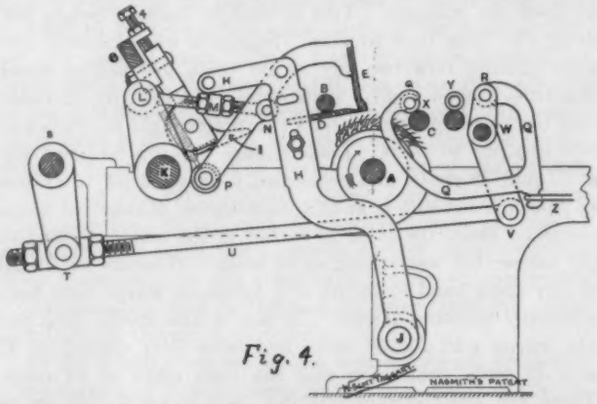


Fig. 4.

shorter portion of a revolution than the forward movement which occurs in passing from the 3rd position to the 1st position, we therefore obtain a slower movement of the nipper, as it approaches the detaching roller than when it recedes, but each of these motions are themselves variable as shown in the diagram in Fig. 6.

The curves exhibit the varying speed of each to and fro movement and we can easily see that at the beginning and end of both forward and backward motion of the nipper plate, there is a slow movement, consequently there is no sudden tearing action or shock, and this may be set down as a very distinct advantage.

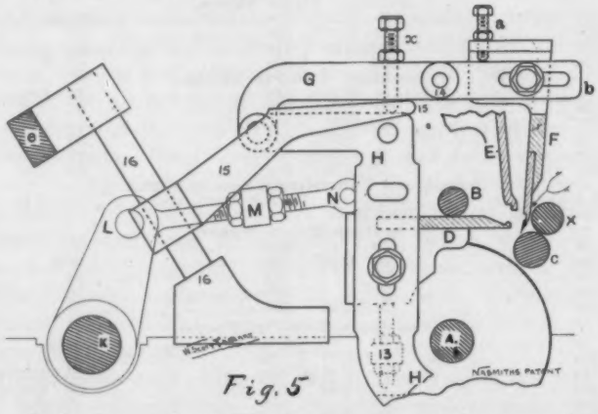


Fig. 5

Referring again to Fig. 3, we can trace the connection and the action of the top nipper E. The top nipper arms are centered at N on the nipper bridge so that it partakes of the to and fro motion of the nipper plate and arm H. As the nipper plate and feed roller move forward together, the feed roller feeds a certain length of cotton and the nippers at this stage must be open to allow the fed cotton to pass forward. This opening is effected by an extension of the top nipper arms whose lower end carries a

bowl P which comes into contact with an adjustable fixed incline I so that as the arm H moves forward towards the detaching roller, P is depressed and E is raised. Strong springs are attached to the extended top nipper arms so that when the backward motion of the nipper plate and arm H takes place, the bowl P leaves the incline I and these springs close the nipper jaws tightly together. It will be seen that the whole action is unusually gentle and that there is very little pressure on the springs as the nipper opens, but a fairly strong pressure when they are closed during the combing action, it is practically free from any of the shock or hammering found in some combers at this point. The incline 1, Figs. 3 and 4, is carried in a bracket from the

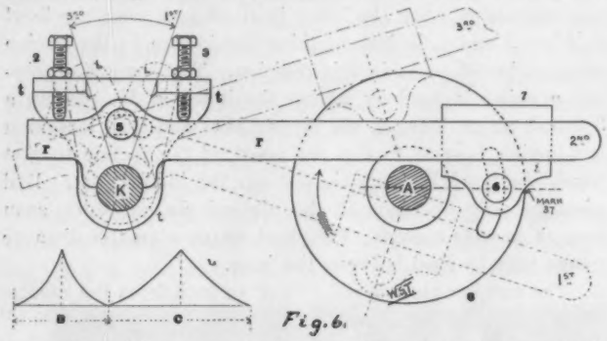


Fig. 6.

cross piece "e" and can be regulated by the set screws "4," as well as by an adjustment on a stud bolt around which it can be moved.

The top comb can now be noticed. This feature is carried from an extension of the arm H. See Fig. 5. An arm G pivoted on H carries the top comb F and permits of an in or out as well as an inclined adjustment. Its attachment to the arm H involves it in all the movements of H through the nipper shaft K, so it has the to and fro motion of the nippers and feed roller.

, To raise and lower the top comb, a fixed bracket "15" with an inclined arm is employed, on which rests a set screw "x" in the arm G. The forward and backward mo-

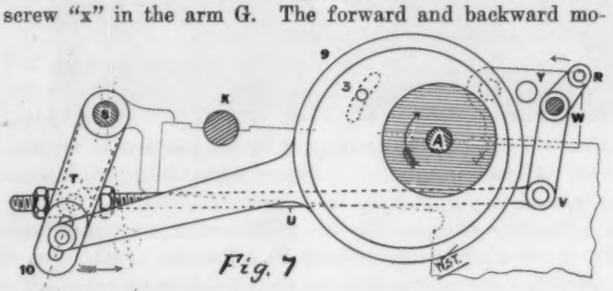


Fig. 7

tion of G naturally raises and lowers the top comb and in a perfectly smooth, easy manner, and at the moment required; the incline is adaptable and adjustable, whilst the set screws "x" permit of very delicate settings of the comb in a vertical direction.

The detaching rollers are operated by the quadrant or sector mechanism so well known on the Heilman comber. The gearing plan illustrates this; the cam, of course, is shaped to suit the longer forward and backward movements of the roller, but the method is the same, associated naturally with the catch-box on the roller. The top detaching roller is worked by an eccentric and not a cam, as is usual. Figs. 3 and 4 show how this roller Q is coupled up by levers and links to the shaft S, whilst Fig. 7 illustrates the eccentric which gives to shaft S its reciprocating motion.

It will readily be seen that this eccentric will cause the top detaching roller to move to and fro over the top of, but in contact with, the bottom detaching roller and that it never comes into contact with the combing cylinder. Its arc of movement is greater than in the Heilman comber, but its surface speed is about the same. Since there is no necessity to give a sudden speed equal to the cylinder as in the Heilman, the cam is designed to start and stop the rollers gently.

Adjustments are provided for setting the detaching rollers through the link rod U, Figs. 3 and 4, and the throw of the eccentric is also adjustable in the lever "10," Fig. 7. It will be noticed that the top detaching roller is weighted. It may be pointed out that Figs. 3 and 4 represent the mechanism in two extreme positions so that a study of them will do much to convey a correct idea of the chief actions.

In Fig. 8 is illustrated, diagramatically, the cycle of operations. In diagram No. 1, the nippers are closed and in their extreme back position, the cylinder combing the cotton and the detaching roller has moved towards the nippers. Before the fine needles of the cylinder have passed through

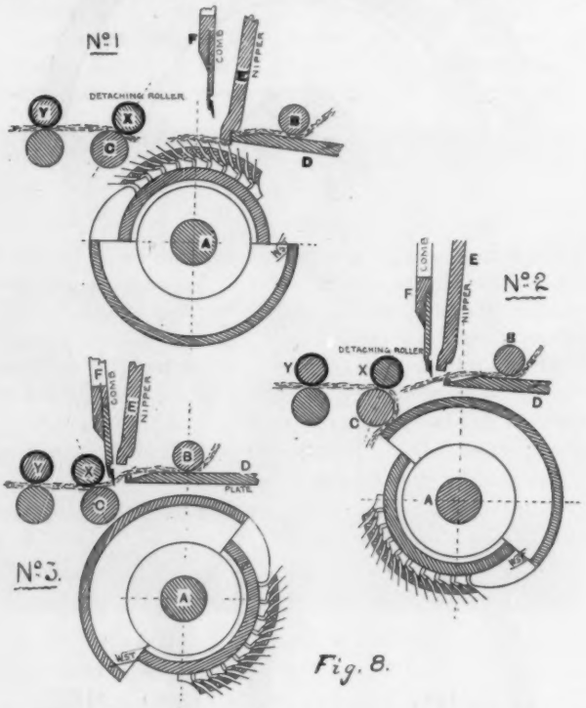


Fig. 8.

the fibers the nipper will have commenced to move forward in the same direction as the needles are moving. This reduces any strain on the cotton and makes the combing action very gentle. The top comb is kept up out of action.

In No. 2 the combing action by the cylinder is completed and the nipper has opened and is midway in its journey towards the detaching rollers. Immediately the last row of needles passes the roller C the detaching roller revolves backwards and as the top detaching roller is some distance over the center of the bottom roller, the cotton is directed downwards into the space between the needles and cylinder segment, and presents a clean surface for the next tuft of cotton to be placed on it. In the meantime the nippers have opened and the combed cotton projects outwards towards the nip of the rollers, being prevented from rising too high by the top comb which is now being lowered.

At this moment the detaching rollers commence their forward revolution and take the newly combed cotton forward along with that portion previously fed backwards by them. This action compels the cotton to pass through the top comb

which now occupies its correct position for combing. All this time the nipper, tightly closed, is moving forward and deliverying the combed cotton. At the same time the top roller is moving away as the nipper and top comb approach, but they eventually reach their nearest approach together as each finishes its respective motion. However, a fraction of a revolution is continued by the detaching roller in order to start the separation of the tuft whilst the total separation is completed by the return of the nippers. No. 3 shows the action just previous to the return of the nippers and whilst the top comb is in operation.

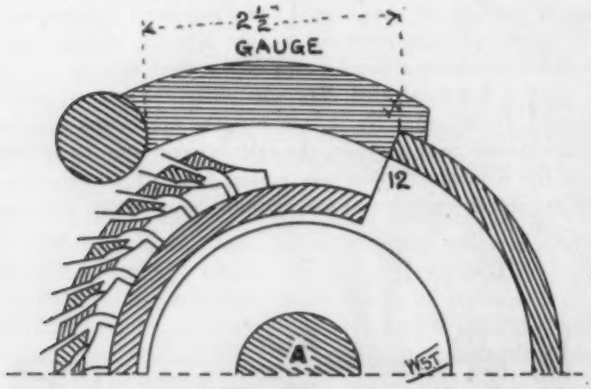


Fig. 9.

SETTING.

The bottom detaching roller has the position of its bearings marked on the stands, so if it happens to get disturbed it is an easy matter to reset it. The distance of the surface of the roller from the plain segment of the cylinder is .050 of an inch. The cylinder is set as per Fig. 9. Place them in the middle of each head and set them by the gauge which is 2½ inches from edge of segment to surface of rollers; screw them up tightly on the shaft in this position, the index finger being at 2½ on the index wheel.

Nipper Crank Stud. Fig. 6 shows the setting of this stud. The center of the stud "6" must be set radially in a

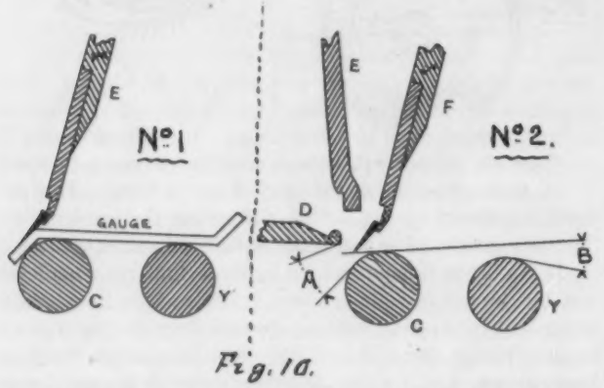


Fig. 10.

line with mark 37 on index wheel. A slight adjustment may be necessary for improved piecing and its alteration will not affect other settings. It will be noticed that the position of this stud determines the time when the nipper reaches its nearest position to the detaching roller, so it is an important factor for good work. If timed too early, the fibers may be curled up by touching the roller before the forward motion has commenced and the roller will continue to revolve too long after the nipper has gone back; this must be avoided with short cotton. If too late the separation is bad and too much waste is made.

The Nipper. The nipper is at the end of its forward stroke at 19 on the index and the bottom nipper plate or cushion plate must be set parallel to the steel detaching roller and at the correct distance. See Fig. 10, No. 1. This setting is important, as on it depends the length of fiber carried forward and therefore the amount of waste taken out.

For American cotton the distance A, Fig. 10, No. 1, should be ¼-inch, for Egyptian cotton 5/16 to 3/8-inch, and for Sea Island cotton 3/8 to 9/16-inch. For any given cotton the greater the distance the greater the waste made. A stepped gauge is usually used for setting, having varying thicknesses, differing by 1/32-inch for each step. The nipper must open when the index is at 28 and when the bowl P, Figs. 3 and 4, is just touching the incline I; the incline being adjusted to be in this position. The amount of nipper opening is fixed by setting the index at 19, placing a 3/8-inch gauge between the nipper jaws and then loosening the incline I so as to dip the point of the incline to just touch the bowl P; then tighten up the incline bolt. Bad piecings may be made if the nippers do not open soon enough or wide enough. For short cotton a greater distance gauge may be used between the jaws.

The cushion plate is set .025 of an inch from the needles of cylinder, the adjustment being made by the screw "13," Fig. 5, and at index 33.

Top Comb. At index 19, the points of the top comb must always be 1/16-inch from the bottom detaching roller, see Fig. 10, No. 1, where a 1/16-inch gauge is shown. This is easily effected through the set screws "a" and the lateral movement of comb, as illustrated in Fig. 5.

The depth of the comb is set by using a thin steel gauge .006 of an inch, as shown in Fig. 10, No. 2, the distance varying from nothing up to ½-inch. The greater the distance B is, the more waste will be made.

The top comb must lift at index 11 so the lifter incline "15," Fig. 5, must be adjusted to the bowl "14" to do this. For short cottons and low waste, index 13 may be used, but too late an action is bad for long cottons.

Feed Roller. The slot shown in the arm H, Figs. 3, 4 and 5, permits adjustment. For long cottons set the roller as far back as the slots permit. For short cottons ¼-inch forward. The feed is regulated by the position of the stop pin "q" (see Fig. 2). 5 teeth are equal to ¼-inch lap per stroke.

Leather Detaching Roller. This roller must just begin to move when the index is at 20. The slot at "3," Fig. 7, permits the eccentric to be set so that this can happen. The position of the roller must be such that it is as near to the top as possible without rubbing when the index points to 19.

The detaching roller clutch must begin to move at index 38. Loosen the stud of the clutch fork and set the index at 10. Move the stud along its slot as far as it will go and fix it there so that it is certain the clutch will be held home. Turn until the clutch is fully out at index 28 and set the clutch wheel in position by the peg so that the teeth are not opposite to each other.

To time the detaching rollers, the cam must first be loosened and turned back as far as it will go. Then turn to index 1 and move the cam forward until the roller begins to turn backward.

It is noted that the Bombay mills are now spinning from Egyptian and other imported cotton, yarn of No. 40 and upward.

BEAMING IN A ENGLISH MILL.

Contributed exclusively to COTTON.

BY J. W. KIRKWOOD.

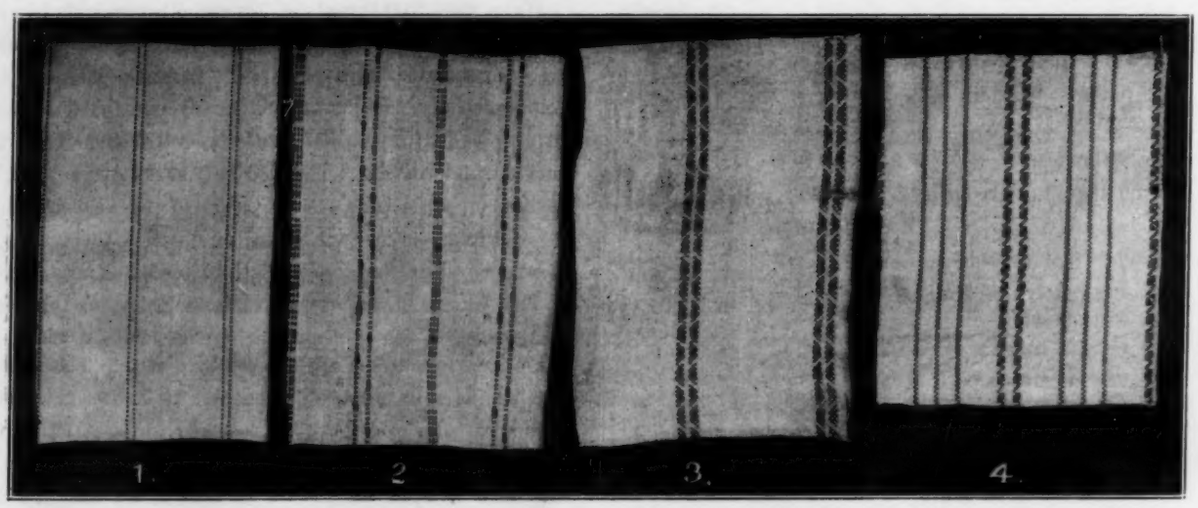
There are many methods adopted for preparing warps for fancy goods weaving, but up to the present time Yorkshire beaming or dressing, as it is called, is the best all-round system in use today. The warps made by this system should be as near perfect as possible if the work is done by competent hands. It is a much cheaper system than many manufacturers are likely to think.

The old method of making fancy warps by the system of winding from colored or white hanks on to warper bobbins, preparatory to mill and sectional warping, is gradually becoming obsolete as there is greater waste of yarn and it is more expensive in every case. The system of ordering yarn from the spinner in warp and dyeing or bleaching these according to the required patterns is becoming universal. One point in favor of this is that all the yarn ordered is used up, there is nothing left, the calculated length of yarn is delivered and winding expenses are saved. A system of beaming by running warps containing a certain number of half-beers or porters (groups of threads from 4 to 24 upwards in number) through a coarse reed containing as many splits as there are half-beers in the warp, is now in use at some mills, and may be successful when made from a low number of counts and threads in the warp. For fine goods or warps containing a large number of threads the above system is not suitable. The difficulties of the weaver are great, due to twisted half-beers which cannot be rectified in the loom and the result is badly woven cloth.

For cloths of one color, half-beer beaming is not suitable nor reliable, the shade is not level and streaky places in the cloth due to unevenness in dyeing are commonly met with. In this method two dyed warps are employed which are run together on the weaver's beam by laying the half-beers of the first warp in every alternate split in the reed, and the second warp in the splits remaining. The two warps are then run together on to the weavers beam and the lease of each is opened at the finish. Thus two pairs of lease rods will be required in the loom.

The idea of Yorkshire beaming is to produce level cloth by laying one thread from each warp side by side on the weavers beam, which will level the shade so that if there be any defective dyeing one warp will have a tendency to cover the defects of the other. In this system all the half-beers are split up, there cannot be any twisted places, and the result is greater production and more comfort of working for the weaver. Yorkshire beaming is the best method for fancy warps, it is not very costly, the best results are obtained from it, and it is certainly reliable. In a warp beamed by this system there should be no threads missing and no bobbins required to make up the warp. It should be complete and perfect. The writer has from his experience and from visits to several large mills concluded that Yorkshire beaming is the best system.

It is here intended to give the full details of the manner in which an order is carried out, the method of ordering warps from the spinner, sizing or dyeing instructions, and the beamers particulars in detail. We will assume that we have an order for the patterns given. Numbers 1, 2, 3 and 4 required 800 yards of cloth of each pattern, 32½ inches wide. Particulars: 40 dents per inch in the reed, 2 threads in 1 dent, 34 ½ inches in the reed space = 80 threads per inch × 34½ inches = 2760 threads in each warp. For 800 yards of cloth allow 864 yards of warp for shrinkage during weaving. Divide each warp into 8 cuts of 108 yards each for 100 yards of cloth per cut. The warping patterns are given below:



Warping Pattern of No. 1:

20 threads white.
1 thread black
2 threads white.
1 thread black.
20 threads white.

44 threads per pattern.
62 patterns in width of warp.

2728 threads
32 threads selvedge=16 each side.

2760=Total threads in warp.

Warping Pattern of No. 2:

2 threads white.
2 threads black.
27 threads white.
1 thread black.
1 thread white.

1 thread black.
1 thread white.
1 thread black.
28 threads white.
2 threads black.
2 threads white.

68 threads per pattern.
40 patterns in width of warp.

2720 threads.
40 threads selvedge—20 each side.

2760—Total threads in warp.

Warping pattern of No. 3:

30 threads white.
4 threads black.
2 threads white.
4 threads black.
30 threads white.

70 threads per pattern.
39 patterns in width of warp.

2730 threads.
30 threads selvedge—15 each side.

2760—Total threads in warp.

Warping pattern of No. 4:

2 threads white.
4 threads black.
18 threads white.
2 threads black.
8 threads white.
2 threads black.
8 threads white.
2 threads black.
18 threads white. . .
4 threads black.
2 threads white.

70 threads per pattern.
39 patterns in width of warp.

2730 threads.
30 threads selvédge—15 each side.

2760—Total threads in warp.

Beamers Split Sheet.

Pattern	Threads of 32's white	Threads of 2/40's selvedge	Threads of 32's black	Yards length of warp	cuts
1	2604	32	124	86.4	8/108 yds
2	2440	40	280	86.4	8/108 yds
3	2418	30	312	86.4	8/108 yds
4	2184	30	546	86.4	8/108 yds

The four warps of 32's for white may be ordered from the spinner to the bleacher separate. The 2/40s being only a small number in each warp may be ordered together. The black may also be ordered from spinner to dyer in the same way. The instructions to the spinner will be as follows:

4 warps, one each 2604; 2440; 2418, and 2184 threads, 32's counts; 864 yards each warp for bleacher.

1 warp of 132 threads 2/40s, 864 yards long.

1 warp of 1262 threads 32's 864 yards long for dyer.

The instructions for the gray warping above is 20 ends per half-beer, end by end lease and half-beer lease at each end, tied cut marks.

Warp with 2700 threads of 32s and other weights in proportion may be ordered with safety, but it is not advisable to go beyond this, as it may result in slack places in the warp especially after bleaching or dyeing. Slack places are very bad to repair and cause unlevel tension from the beam during weaving. The tied cut marks are cut off by the beamer as he runs the warps on to the weavers beam, and each place is marked by red or blue ink to indicate to the weaver when the proper length of piece has been woven.

The warps having been returned from the bleacher, dyer and sizer, the work of placing the yarn for each pattern on the weavers beam is proceeded with. The beamer is given the split sheet and from this he knows how many threads of color and white are required for, say, Pattern 1. The 2604 threads being in one warp will be intact, but he will have to split off the 32 threads 2/40s and the 124 threads black before he can begin to lay his pattern. Below is given a beamers warp ticket which further aids him to understand what is required.

If four beamers were called on to execute this order they would each split the 2/40s and the 32s Black at the same time, each counting the threads that he required thus saving time. All warps must be split in order to take the twist out which may result from ball warping, or during the process of bleaching or dyeing. This helps to open out the warps during the working.

Warps made by the mill warper are much easier to beam than sectional warps. They open out easier and more

Setting Out For Each Warp.

Pattern 1 2 threads black per pattern×62 patterns= 124 threads black
42 threads white per pattern×62 patterns=2604 threads white+32 selvedge
Pattern 2 7 threads black per pattern×40 patterns= 280 threads black
61 threads white per pattern×40 patterns=2440 threads white+40 selvedge
Pattern 3 8 threads black per pattern×39 patterns= 312 threads black
62 threads white per pattern×39 patterns=2418 threads white+30selvedge
Pattern 4 14 threads black per pattern×39 patterns= 546 threads black
56 threads white per pattern×39 patterns=2184 threads white+30 selvedge

work can be done in less time. The fault found in sectional warps are slack places which are sometimes the width of a section. Sometimes it has been found necessary to break these slack ends and tie them up to the same tension as the other part of the warp to enable the beamer to lay the yarn on to the weavers beam level. Knots are caused through the tieing up which means faulty cloth and further trouble for the weaver.

The method of running the warps on to the weavers beam with diagram of machine is given at Fig. 1.

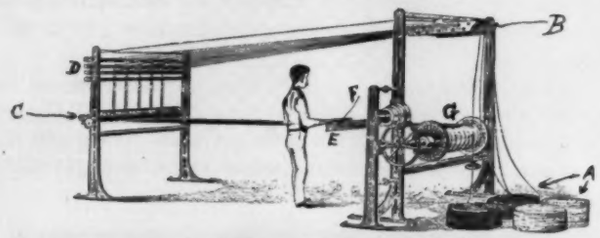


FIG. 1. A TYPICAL BEAMING MACHINE.

A are the warps.

B is the tension box to put drag on warps.

C is the measuring roll and clock.

D are dividing rods to keep each warp separate.

E is the reed through which the threads pass.

F is a rod which divides the two warps.

G is the weavers beam.

By using a presser motion with a presser roll that will fit exactly between the flanges of the beam and applied by a lever and weight 40 to 50 per cent more yarn can be placed on the weavers beam without any trouble, thus, the saving of drawing through the heddles, less gaiting of warps in the weave shed, and the saving of time is considerable, as well as an increased output.

Below is given a plan of the method of "sleying" or the manner of placing the threads from each warp into the beamers reed. See Fig. 2.

Explanation of Fig. 2. A are the two warps which will be run together onto the weavers beam. C and D are rolls dividing rods of beamer. E is the beamers reed showing four threads in 1 split of the reed. F is a rod which divides the two warps, all odd threads are over the rod 1-3 and even threads are under the rod 2-4. After the whole of the threads have been drawn through the splits of the reed by a hook, they are tied to the weavers beam and run as in Fig. 1.

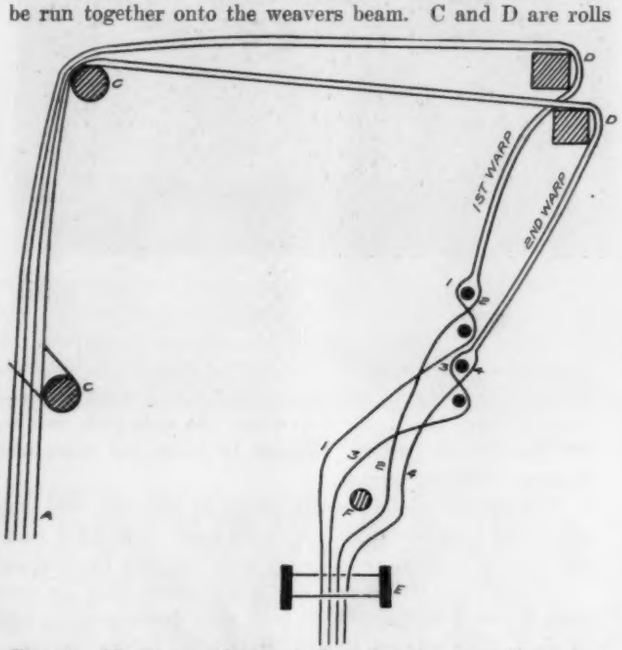


FIG. 2. METHOD OF "SLEYING" OR PLACING THE THREAD IN THE BEAMER'S REED.

The method of ascertaining the various reeds required is by dividing the number of threads in the total warp by the inches in width between the flanges of the beam, adding 1 inch for contraction between the width in reed and the beam, due to tension put upon the warps when running. Example: A warp has to contain 2812 threads on a 36-inch beam what splits per inch will be required in the reed? 36 inches plus 1 inch for contraction equals 37 inches in the reed. 2812 threads would be 76 threads per inch. As there are 4 threads in each split a reed with 19 splits per inch will be required. When the whole of the warps have been run onto the weavers beam a lease is picked by the beamer, a split at a time, until the whole of the warp has been done in this manner. The beamer places a cord to indicate the lease for the drawer, as well as for the weaver. After drawing, the warp is ready for the loom.

32-S WARP STOCK AND COLORS.

Counts	32	—	—	—	—	—	—	—
Length	800 yards	—	—	—	—	—	—	—
Color	Blue	Red	Green	Brown	Pink	Fawn	Cream	Date
Threads	1000	1000	1000	1000	1000	1000	1000	15/10/10
Reduced	750	800	675	900	750	550	675	20/10/10
"	500	700	550	700	600	270	540	25/10/10
"	250	500	310	300	130	180	290	30/10/10
"	50	200	125	160	20	60	100	

FIG. 3. METHOD OF KEEPING WARP STOCK.

At most places it is not usual to keep beamers warps in

Beamers Warp Ticket

Date Nov. 1st 1910

Length 864 cuts 8/108 yds

Counts 32 - 2/40

Pattern 1

Warps 2

Ends 2604 white

" 124 black

"

"

"

"

Selvedge 32 - 2/40 white

TOTAL ENDS 2760

Remarks:

Keep the Selvedge tight.

124 Blacks from Splitting.

All Threads to be picked up single for weaving.

Lot No. 1

Dresser Smith.

stock unless they are for standard cloths; however, where stocks are kept a book is used for the purpose as in the following Fig. 3, which shows how the book is ruled out and the reduction is crossed out when splits are taken from any color. It is usual to order warps containing 1,000 threads of the length and counts desired, and when any number of threads are taken away from this number, it is kept on record, as shown at Fig. 3. The book should contain a page for each of the various counts of yarn, colors, length, and any other particular. If the book is kept in order it is easy to see that few mistakes will occur. On each warp there is a tag, or ticket, and it is the duty of the beamer when taking threads from any warp, to record on the ticket what number of threads he has split off, so that the stock keeper and the beamer check each other.

On Fig. 3 it will be noticed that 8 warps of various colors of 1,000 threads each were in stock and during the working out of various patterns they decrease in the number of threads at various dates, leaving the present stock at the bottom not crossed off. This can be done as each order is carried out, when it can readily be seen what is required and the yarn in stock towards covering for each particular order. This keeps a perpetual inventory of the stock on hand.

FANCY MERCERIZED CLOTHS IN COLORS.

(*Contributed Exclusively to* COTTON)

BY SANDERSON W. HAYES.

The cloth shown in Fig. 1 is a "Brilliant" combined with a satin stripe and is all combed stock, both warp and filling. This cloth is made 32 inches wide, woven in an 80 reed and the average sley is 93.6 with picks 76 per inch.

It is made with two warps, the ground warp being 80's and the warp for the stripe 40's yarn; the filling is 28's. The average weight is about 5.77 yards per pound.

There are 28 full patterns and two half patterns with selvage. Each pattern comprises 66 ends of 80's warp on which the figures are woven, drawn one end in a harness and two ends in one dent; and a satin stripe of 36 ends of 40's warp drawn one end in a harness and six ends in one dent.

The small figures by the sides of the satin stripes it will be noted are uneven. One is six floats and one is five floats. The five float figure commences 18 picks after the six, while there are but 15 picks between the five and the six in the repat.

The reader will note that the diagram of the weave only shows twelve squares in width for the satin stripe while there are 36 ends.

This fabric has been mercerized and dyed in the piece when finished.

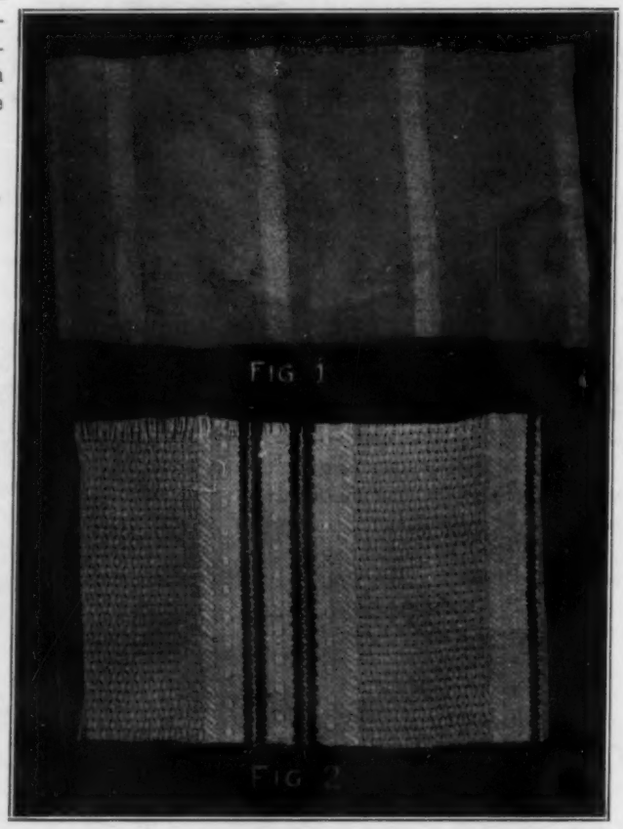
For this cloth the warp of 80's is made up of 1952 ends including 40 ends for selvages. Of the 40's yarn for stripes 1044 ends are necessary.

A good cloth in this line could be made in a mill where the machinery is not adapted to make such fine yarns as the sample by using a 64 reed two ends in a dent for a ground warp of 50's yarn and six ends in a dent of 25's yarn for the stripe, with 20's filling for 60 to 64 picks. This would be satisfactory for mercerizing in the piece.

The style of cloth illustrated in Fig. 2 is a very good combination of weaves for use on other than mercerized yarn if the balance of yarn with the reed and pick are preserved.

The basket weave in the broad stripe of pink is also known as the four by four mock leno and is a very useful weave for making an open mesh effect. The white stripes on each side of the basket weave and the clusters of black stripes are woven with a three up, one down, one up, and one down twill, drawn two ends together, they may be drawn in one harness eye and four ends in a dent. Between the white twill stripe and the black stripes are six ends of plain followed by a cord of three ends and the float of five picks in this cord is enough in this construction to give a spot effect.

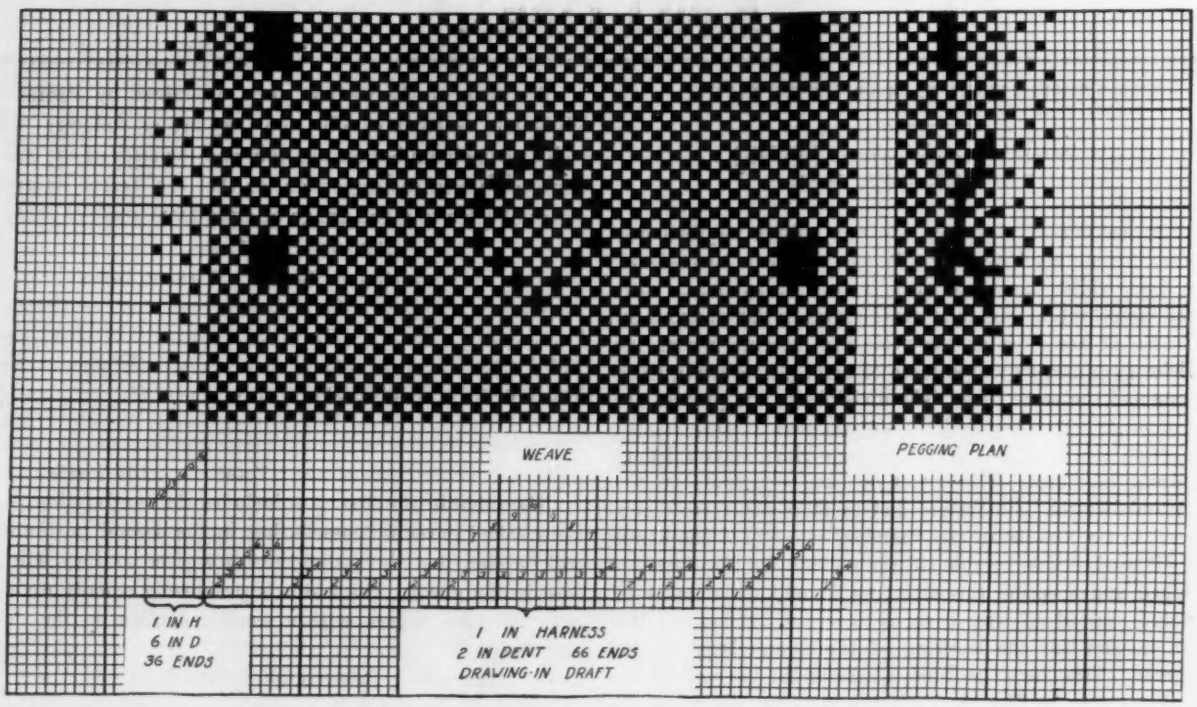
The white warp yarn and the filling are bleached and the goods are woven in a 64 reed, average sley about 76.41 ends per inch; 28 inches wide; 56 picks per inch. Warp and filling are 2 ply 36's mercerized cotton yarns, average weight 3.75 to 3.80 yards per pound.



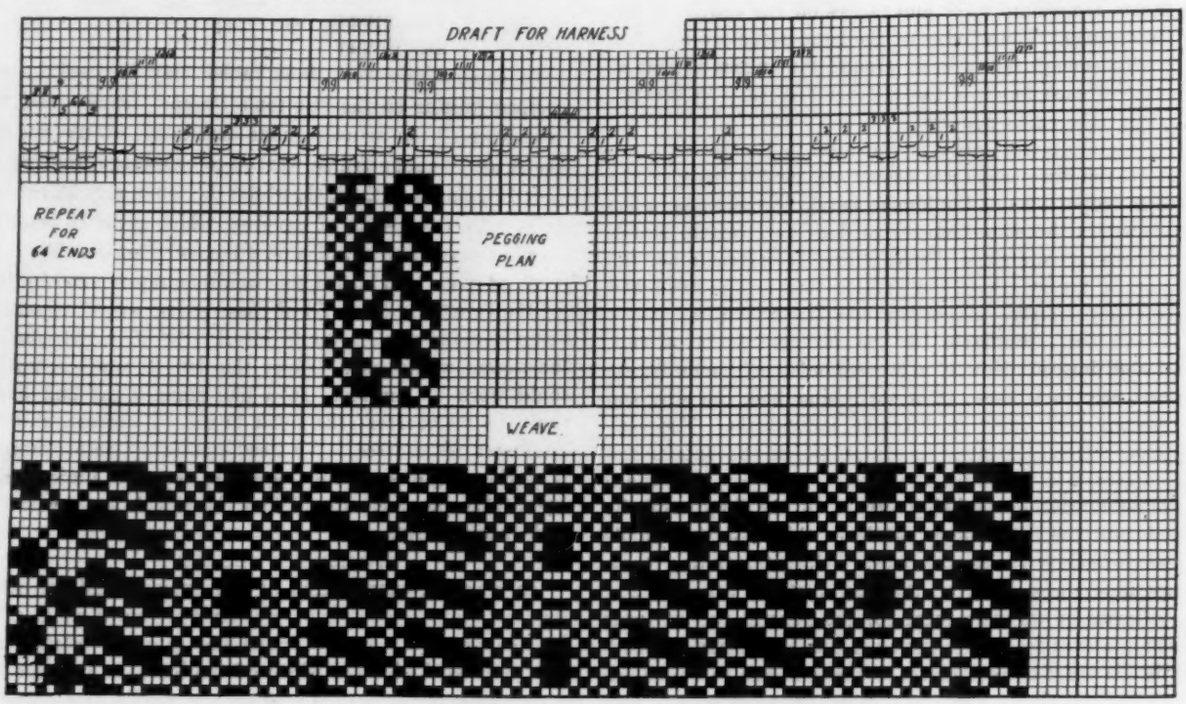
The harness draft, pegging plan, and weave show clearly how the combinations are made and the dressing plan would be as follows: Dress 24 ends white for selvage. Commence patterns 23 ends white. 8 ends black. 2 ends white. 8 ends black. 15 ends white. 8 ends black. 2 ends white. 8 ends black. 23 ends white. 64 ends pink, making 161 ends in one pattern. Repeat 13 times and finish with 24 ends white for selvage.

The beamer would require warps as follows: 893 ends white, 416 ends black, and 832 ends pink, total 2,141 ends; and also make an allowance of 6 to 10 per cent for take-up.

If the pink stripe was any other weave than an open mesh it would be desirable to commence dressing warp with 24 ends white selvage, then 32 ends pink, before commencing on the stripes, and making the last pink section of the thirteenth pattern 32 ends only. This would improve the



DESIGN WITH HARNESS DRAFT AND PEGGING PLAN FOR FIG. 1.



DESIGN WITH HARNESS DRAFT AND PEGGING PLAN FOR FIG. 2.

appearance of the cloth in the piece but would not be so useful for joining the cloth when making up the goods as leaving the selvage next to the white twill stripe on one side and the salvage next to a full pattern of the basket weave on the other side. These fabrics may be made in all the usual colors of indigo blue, sky blue, red, pink, brown, green, ecru, and tan.

Don't try to blame all your troubles on the other fellow.

An American consular officer reports that a foreign business firm requests the offerings of gray sheetings from the United States. The firm desires correspondence only with first-class manufacturers or manufacturers' agents, and wishes to receive no merely speculative offers. This is said to be a large firm with branches in various other cities with good connections. Those interested should apply to the Bureau of Foreign and Domestic Commerce, and refer to file No. 10260.

KNITTING.

KNITTED GLOVE MANUFACTURE.

(Contributed Exclusively to COTTON)

BY WILLIAM DAVIS, M. A.

The making of gloves on the flat knitter requires one worker to one machine and only one part can be made at one time, whilst the whole work is entirely by hand. Another important method is to make gloves in flat portions on a frame of the type of the "Cotton's Patent" where the divisions are narrow and a dozen or more gloves are in work at one and the same time. The divisions in the process are the same as were described for the seamless gloves, that is, the wrist, the hand and the fingers are added separately on different machines. The wrists or cuffs are made on the "Cotton's Patent" rib frames and in their flat form transferred to the needles of the "hander" machine. The hands are all worked side by side till the portion for the thumb is reached and a cotton thread is put in and the number of stitches pressed off with it so as to secure the loops which will be used for the working of the thumb later on the fingerer. This done the work proceeds till the end of the hand is reached. The hand stitches are now run on to the needles of the fingerer frame and the fingers are in turn worked in the form of flat ribbons to the tip, when fashioning tackle comes into work and tapers off the end by suitable narrowings. The stitches of the hand alone are not able to provide enough fabric to go around the fingers so that at the edge of each finger a few stitches are made to overlap to provide the extra material.

As the fashioned glove is intended to fit the hand accurately, the dimensions are drawn out on the basis of the average proportions of the human hand. Experience in the trade enables the manufacturer to decide on certain standard dimensions and sizes. There is first to be determined the relation of the length of the cuff, to that of the hand and fingers, respectively. After that the finger lengths have to be drawn out. Similarly for the various widths of cuff, hand and fingers. Now if a large number of hands be examined, say in a class, it is surprising how the size and dimensions will vary in different individuals. The outstanding differences occur in the length of the fingers and the difference in the width of the various fingers. In length the chief variation probably occurs in the length of the thumb and the little finger, while in thickness the middle finger probably varies the most. Notwithstanding these minor differences, however, the manufacturer can arrive at an estimate of standard sizes for the general run of trade whilst the over-fastidious customer has the option of sending in his exact measurements to the firm and to have them made to exact size, a luxury for which he must be prepared to pay a higher price. Some firms lay themselves out for the supply of gloves to persons who have one or more fingers missing, for whom it is a simple matter to provide a glove to exact fit.

Whilst there can be little variation in the relation of the average length of the hand to the finger portions, the length of the wrist depends on the purpose for which the glove has to be applied. In the ball room the wearer desires a glove which will give quite a short cuff, that it may be easily drawn off and on, while for outer wear a longer cuff is usual.

The sizes of the various parts are given by Professor Willkomm as parts of 100, and they are as follows: The width of the hand is taken as 100, and the sizes of the other parts are taken in proportion, so that the figures he gives are applicable to a full range of sizes from small to large.

BREADTH 100 PARTS.

	Including Gores	Without Gores
Thumb	40	
Forefinger	33	26
2nd Finger	33	26
3rd Finger	31	25
4th Finger	30	23
Total	100 Parts.	

The table in the first case includes the overlapping portions called gores or gussets, but in the second portions it will be seen that the proportions are given as they will be seen in the glove. The width is practically equally divided over the four fingers, with a small reduction on the third and fourth.

LENGTH 100 PARTS.

Thumb	40.
Fore Finger	50.
2nd Finger	55.
3rd Finger	52.
4th Finger	45.

To demonstrate how these tables may be used by the practical knitter on the "Cotton's Patent" frames used for the making of the articles under discussion, let us take the case of an 18-gauge frame worked to the gauge, that is, we insert 18 courses to the inch, whilst there are only 12 needles per inch by the system of gauging, which gives 18 leads of two needles each on a width of 3 inches. Suppose the total length of glove be 6 inches, this would be represented by 100, and the forefinger being 50 of those parts, would measure 3 inches and the worker would insert $3 \times 18 = 54$ courses. The thumb would have 4/5 of this length and the worker would work 43 courses. In a like manner the 2nd finger would be 59 courses; the third finger 56 courses, and the 4th finger 49 courses. We need not complicate examples by working figures out for the width, except to indicate that the stitches per inch are 12 and the calculations would be made accordingly.

DIVISIONS OF THE HAND.

In a casual examination of the human hand we notice that the width is approximately divided into 4 equal parts for the fingers. On the frame the glove is worked flat in a piece at double the width of the hand, so that the latter is subsequently turned over on the middle point and the front portion of each finger is seamed to the back portion with the addition of the gusset to give the extra room to go round. This suggests that in dividing off the fabric width for the addition of the fingers we shall require at least 8 divisions for the front and back portions respectively of the four fingers. This is true in practice except that we must bear in mind that the folding over of the fabric takes place along the line of the fabric for the forefinger, and an extra division is allowed for this.

The exact process of division will be evident on referring to Diagram 1, where Figure A shows the appearance

of the glove before being seamed up into the proper form. The portion R shows the rib or cuff part constructed on a rib frame and transferred to the needles. The width is seen to be divided into 9 equal portions as indicated in the explanation above and they are for the purpose of showing how the width is divided between the various fingers. The hand is worked at uniform width until half way up when the portion of the thumb is reached. As the glove under consideration is intended for the right hand three divisions, 3, 4 and 5 are set off for it. This is done by working in a cotton thread at that part which has an end left so that the stitches may be readily unraveled when they come to be transferred for the working in of the thumb. The hand is now continued as before, the full length and the three divisions 4, 5 and 6 are allowed to remain on at the width g g′ and the fabric continued at this width till the whole extent of the finger has been worked, when it is concluded by narrowing at the tip and the remaining stitches are drawn off on the one thread. The second finger is worked in two portions, the front portion occupying division 3 and part of

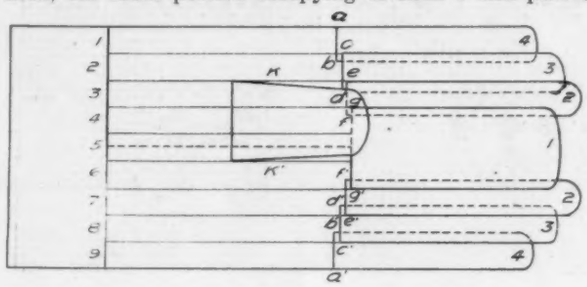



FIG. A

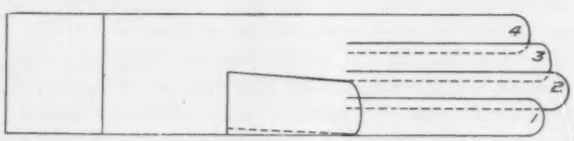


FIG. B

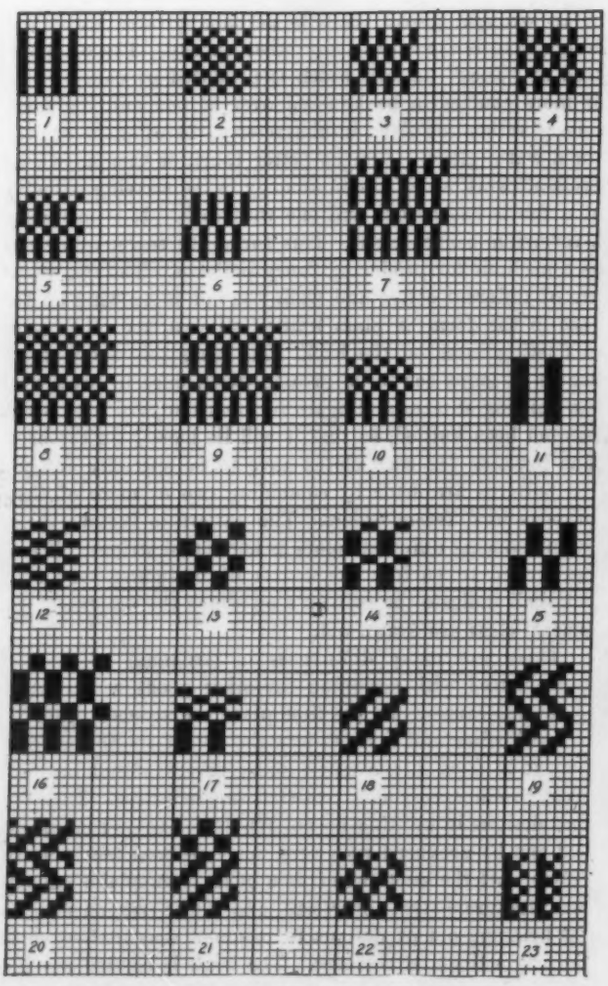
DIAGRAM I.

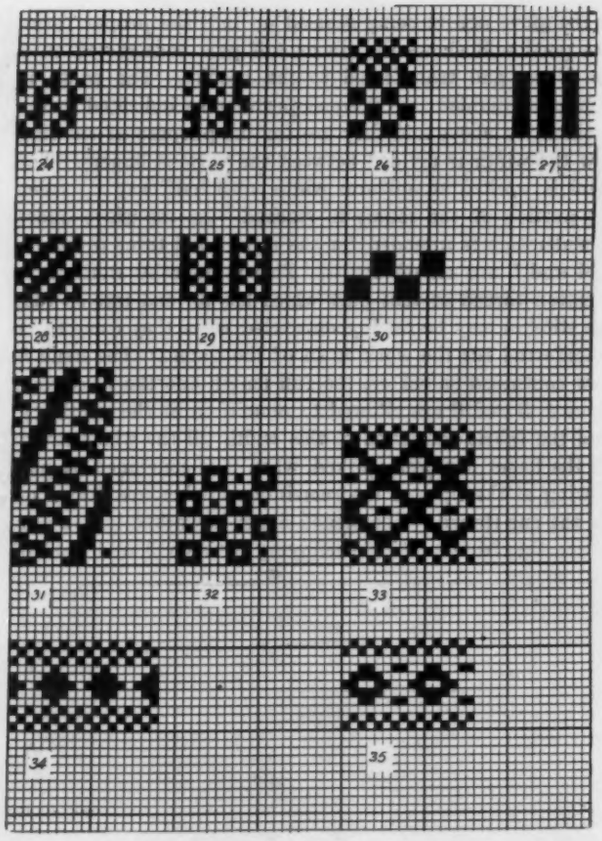
portion 4, the back part occupying division 7 and part of division 6. The extra part overlapping on the adjoining division is for the purpose of providing the extra width necessary for the gusset of the glove and is obtained by running on the edge stitches of the fabric already worked. Similarly the third finger extends over c d over divisions 2 and part of 3 on the left hand and over c′ d′ over division 8 and part of 7 on the right. The fourth finger extends over a b on the left on division 1 and part of 2, and on the right a′ b′ on division 9 and part of division 8. Each finger in turn is made to the height shown in the foregoing table of proportions and narrowed in at the end to present a tapering tip. The thumb is also made as shown at the part k k′, which two edges are afterwards seamed together to give the circular form. When the fingers have been completed the whole glove is folded along the dotted line and the two edges of the forefinger are seamed. The right hand portion of the second finger is afterwards seamed to the left hand portion stitch for stitch, and so on for fingers 3 and 4. The complete article is shown finished in Fig. B, the hand being closed by seaming the extreme left edge to the extreme right. The pair is made by having another glove for the left hand, the chief difference of which is that the divisions for the thumb are taken at 5, 6 and 7, the article being in every other respect identical.

In wrought gloves there is perhaps greater scope for design than is the case in any other variety. The ordinary kind of "Tuck" pattern which is produced by causing two or more courses to be knocked over at one and the same time is rather too slack in character to be of much service for a warm glove. A much better fabric is that known as press-off work which has an analogy in the weaving industry of a fabric backed one and one with weft. It is in reality a reversible backed cloth. This forms the secret of its use as a medium for producing fancy patterns. The two yarns are of different colors and while the one is showing on the face in the form of plain knitted stitches, the other color is floating loose on the back. To bring this about every course of loops has to be pressed twice, once to press over the knitting stitches and again to press the yarn over which has not been knitted, so that it will lie loosely on the back. The pressers for such cloths have to be specially cut and the patterns are made by combining two or more of these pressers in different orders. The pattern is further varied by introducing different colors as horizontal stripes. We do not intend to go into the matter of designing very fully but shall indicate the principle on which the designs of the general class are drawn out.

There are many differences in designing for knitted as compared with designing for other goods which is due to several causes. In the first place the stitches present a larger surface and a stitch brought out of its normal position as is done in the stitch under review stands out with great prominence and is rendered very effective. Thus it is that designs in knitting do not require to be so complicated and can be produced with very much reduced tackle on the frame. At the same time it is a general complaint amongst manufacturers that overseers and those responsible for the bringing out of designs for the new season show so little originality and resource. The work is carried out in a slip-shod or haphazard manner and designs are more often produced by chance than by careful and systematic experiment. The weaving industry has this branch very much better developed and we shall now endeavor to show the principles on which an endless variety of patterns for fancy gloves may be produced. It is not said that all the designs would make successful articles commercially for between a design on paper and the same in the cloth there is frequently a wide difference. On the other hand if the manufacturer is prepared to test each likely design patiently, he will frequently be surprised to find that a design which looks uninteresting on the design paper is very much improved in the fabric. In this way the range of patterns which he will produce will have something original and distinctive about them and he will be able to command a wider and more exclusive market.

Designs 1 to 10 serve to show how the one and one fancy stitch may be used as the basis of a large series of glove designs. Small broken up patterns of this character are used to work the fingers and are introduced at intervals on the hand to give variety to the larger effects. Design 1 shows the one and one arranged into the form of a thin stripe. In Design 2 the one and one effect is made alternate so that a broken up arrangement is the result. Design 3 has its one and one arranged horizontally in alternate twos, in 4 the arrangement is altered to two and one, in Design 5 to three and one. Design 6 is a four and four, and Design 7 a four and two. In Designs 8 to 10 the effect is broken up horizintally at intervals by a one and one alternate presser.





An examination of Designs 11 to 21 will show that the arrangement selected is a two and two and that the same principles of variation are used as was the case with the one and one presser with the result that the effects are somewhat larger and bolder. An interesting effect in this connection which is capable of much variation in knitted goods is the twill shown in Design 18, and its zig-zag or herringbone variations in Designs 19 and 20.

Designs 22 to 25 show broken up effects which are the result of combining one and one and two and two pressers time about, and a casual examination of the designs in question will show that quite a simple variation will produce quite a different pattern. Design 26 shows another method of combining the two effects. It is needless to multiply examples because what has been said will serve to show the lines on which designs can be readily produced. Design 27 shows a two in one effect, and in 28 the effect is twilled. Design 29 is a combination of one and one and two and one effects horizontally. Design 30 is a three and three effect. Design 31 is of special interest as showing the result of combining pressers which are of a different repeat number, namely a two and two and a three and three, both of these effects are made to twill to the right producing a steep diagonal effect. Design 32 is a pattern obtained by working ane and one and three and three effects in the order shown. Designs 33, 34 and 35 show "diamond" effects very popular for gloves.

No article on gloves would be complete without reference to the principles of making cut gloves. As has been already mentioned, these articles are cut from uniform widths of fabric by sharp stamps which give many layers at once. These stamps are generally in three sections:

(1) *The Hand.* The general shape of this stamp will be realized on referring to Fig. (A) Diagram I, used to illustrate the wrought glove. The width is uniform and but for the fingers no provision can at this stage be made for gussets or gores. They are simply cut out in the form of flat ribbons the fingers corresponding in number and arrangement to Fig. (A).

(2.) The gussets or gores are next cut out double so that they supply the inside of two fingers at once. There are thus four seams between each of the two fingers.

(3.) *Thumb.* The glove is completed by inserting the thumb separately. It should have been explained that the stamp for the hand included a hole for the cutting out of a thumb portion. The stamp for the thumb fabric is cut out and sewn all round the hole and a seam made up the inside to close up the thumb.

The advantage of the cut glove is entirely on the side of a large production as many layers can be cut out at once.

THE MANUFACTURE OF ATHELETIC HOSIERY.

(*Contributed Exclusively to* Cotton)

BY HENRY K. DICK.

This type of hosieery owes its demand to the popularity of baseabll, hockey, basketball and other games which have the stockings as part of the player's uniform. They are sold largely through atheletic supply stores, where complete uniforms may be had.

To manufacture this type of hosiery, two distinct types of knitting machines are used. These stockings are made in a similar way as children's ribbed hosiery, ribbed legs and plain feet. To accomplish this, a ribber and a footer machine are used. The legs being knitted on a ribber and then afterwards transferred to the needles of the footer and the foot knitted on. The pattern of the rib most used is 2 and 2, that is, we have two ribs on the face of the fabric alternating with two ribs on the back. The needles would be set, two cylinder needles alternating with two dial needles, and this would leave every third groove in the cylinder and dial empty. The shaping of the leg is obtained by tucking the stitch in the upper part of the leg and then towards the ankle changing to plain rib, in this way getting a narrower fabric with the same number of needles. About half an inch from the end of the ribbed leg, a course of long loops is made, this course being used to aid the transfer girl to transfer more easily. These stockings are made up in a variety of colored stripes, each team having their own color combinations.

The machine which will perform such a number of changes, which the manufacture of this stocking requires, must possess some special features not found on the ordinary rib top machine. It must be of larger diameter in order to get the necessary width of stocking. The diameters of these machines will range from 4½ inches to 5½ inches in diameter. The pattern of the rib desired influencing the diameter of the machine needed. A 2 and 2 rib contracts more than a 1 and 1 or 3 and 1 rib so larger machines are required for this rib than for 1 and 1 rib.

The knitting of the tuck stitch or half-cardigan is another special feature of a machine for this work. The machine being only a single feed circular machine a change of the dial cams must take place at each revolution of the head. A half-cardigan stitch is produced where for one course the cylinder needles knit and the dial needles tuck their stitch, the second course both sets of needles knit. Changing from one stitch to another is done automatically and controlled from a pattern disk which operating through a lever raises and lowers a disk at the left of the head of the machine, this disk in turn operating on levers which change the dial stitch cam.

Supposing the stocking to have a different color band in the center of the leg, causing a change of yarns to be made. The machine must therefore have two yarn guides threaded with the different colors required. While the first yarn is knitting, the other yarn is held trapped, so that it may be kept free from contact with the needles or the other yarn which is knitting. When the change is made, both yarn guides are in action for a short distance after which the yarn guide not wanted is lifted up clear of the needles, the yarn being cut by a small shear and the end of the yarn trapped between two tension disks.

The loose or transfer course is made by the cylinder needles drawing a longer loop for one course only. The welts are usually two in number and are made by tucking on the dial needles for two or more courses. The welts give the necessary finish to the top part of the stocking. Owing to the greater contraction of a rib fabric over a plain fabric, it is necessary to use a greater number of needles on a rib machine than on a machine making plain fabric in order to get the same width of fabric. We have usually ⅓ to ½ more needles in a ribber than we have in the footer machine.

This number of extra loops which we have in the leg of the stocking have to be transferred evenly around on the needles of the footer. Take for example a ribbed leg having 108 loops which have to be transferred to a footer having 72 needles, the extra 36 loops we have in the leg are taken up by doubling two loops on every second needle of the footer. A ribbed leg having 160 loops transferred to a footer having 120 teeth would give us 40 extra loops which are taken care of by doubling two loops on every third needle. This operation of doubling the loops is necessary in order that the stocking will be perfectly formed at the point where the transfer is made.

The yarns used for the legs may be colored cotton, worsted or woolen yarns according to the grade of stocking desired. The feet are usually knitted from white cotton yarns.

In the illustration, the end view of the pattern mechanism is shown. Around this disk studs and cams are placed, the studs controlling the number of courses between each change made by the cams. This disk is numbered so that the position of any one stud can be located. These studs acting in the same way as links on a pattern chain. Cam marked 1 is found on the disk between numbers 1 and 2 on the disk, this cam is responsible for the position of the loose course. Cam 2 changes to form the welts. Cam 3 controlls the first yarn change and cam 4 controlls the second yarn change. Cam 5 is set to time the welt disk with the other pattern disks. The welt disk is another disk on

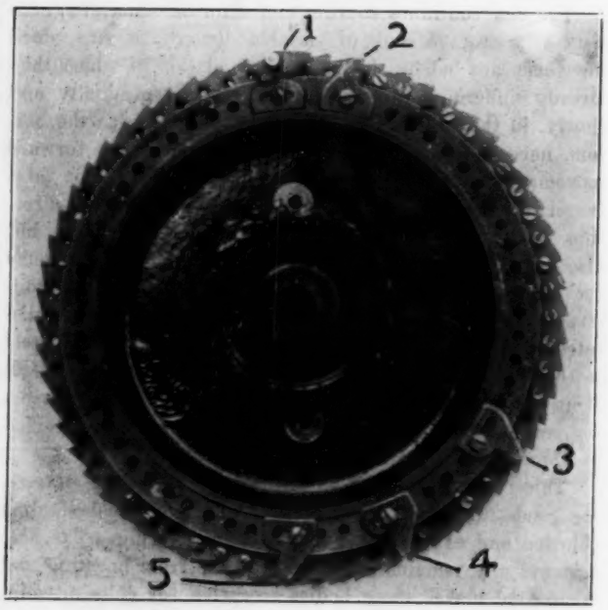


Fig. 1. End View of Pattern Mechanism.

the same shaft as the disk illustrated but is found underneath the head and inside the frame of the machine. From the action of the welt disk, the welts and loose courses are formed. The tucking of the stitch in the upper part of the leg is also obtained from this disk, and for which special cams are attached to the disk. The yarn changes are also made from the welt disk.

The production obtained from a machine on this class of work will run from five dozen per day and upward. The gauge of the fabric and the speed at which the machine is run influencing the production. On woolen and worsted yarns the speed should be less than for running cotton yarns. In footing the legs, one girl will foot from 15 to 20 dozen per day.

DYEING, BLEACHING AND FINISHING.

AN IMPROVED GERMAN BLEACHING PROCESS.

(*Contributed Exclusively to* COTTON)

BY ERNEST STUTZ.*

The Thies-Mathesius-Freiberger process of bleaching in its present complete form was devised after years of practical experience to simplify the entire procedure by so remodelling its various stages that all the operation can be completed in an uninterrupted passage of 24 hours and with greatly reduced labor force. The general lay out provides that after singeing, the goods are first soured and then washed in a continuous apparatus, are then passed through the kier and after bowking are taken through a second continuous washing with intermediate chloring and souring to the final state of finished goods. At no stage of the passage is there a need of storing or handling.

All the apparatus is either entirely of new design or an improvement on known installations and consists of the following: a new continuous souring machine; a new mechanical plaiter; and a simplified kier installation, with lye recovery and increased capacity.

The new continuos souring and chloring apparatus consists of a storage tank of suitable dimensions into which the goods are led by the mechanical plaiter in which they already undergo impregnation. Here they gradually and slowly, in the course of 20 to 30 minutes, sink to the bottom, never however losing a slow but continuous forward movement towards the next machine. The liquor also travels continuously in this tank but in the opposite direction and not only completely impregnates the goods but also drives out the air. In order to increase their efficiency the reagents are heated by an apparatus of special construction as otherwise the Hypochlorides are liable to disintegrate. The period of reaction is made to adapt itself to the speed of travel of the goods and the increased effect from the heating allows of a saving in chemicals. A rinsing compartment follows immediately and in it a specified portion of the reagents is removed.

This method provides an entirely new chloring process, the goods undergoing first the action of the usual alkaline chlorine and afterwards a second sour chloring. The first destroys any remains of color left over from bowking and the second makes those bodies receptive for chlorine solution, which otherwise would remain undisturbed on the goods.

The washing apparatus likewise is of new design. By its use the rope is made to travel over the rollers at the rate of a bout 240 yards a minute, being maintained remarkably supple and elastic through the entire course. After passing over a squeezing roller of unusually large diameter,—30 inches—it travels along the bottom of the trough to 2 lower rollers placed 11 feet 8 inches away from it. This has advantages over both the tight and the slack systems of rope travel. In the latter the rope is liable to settle in small heaps or loose bundles at the bottom of the tank, where they get imperfectly impregnated and are then suddenly seized and squeezed by the roller, and, owing to the tension, the water has not sufficient time to permeate the inner folds and to absorb the impurities. With the new machine in which the 2 lower rollers rotate below the surface of the liquid the goods remain submerged for 11½ feet which is amply sufficient for the rope to be untwisted, to fully open itself under water, and to get saturated to its innermost fibres. A smaller roller mounted above the larger roller, but at an angle of 45 degrees to its perpendicular axis and which runs in adjustable bearings, is pressed against the large roller by means of very substantial springs. Therefore the rope each time it passes through the upper rollers has the water squeezed out and is then drenched with fresh water from the nozzles of the spray box extending over the entire width of the rollers. This also results in a smaller consumption of water. The upper rollers being at an angle the rope travels over a larger surface before being squeezed, the throwing off of the water is more gradual and the rope is not liable to break. Two ropes can be washed at the same time, making the apparatus equal to a total capacity of 480 yards per minute.

As there is no possibility of lost motion through sliding, the rope can pass through a succession of 5 or more machines without intermediate stops by a special contrivance. The rate of travel can also be varied within certain limits. The goods travel in a perfectly straight line without angles or slants which prevents any chance of twisting. The method therefore allows the material and particularly the single threads in it to remain perfectly straight and parallel to the direction of the rope.

From the souring and washing apparatus the goods pass to the kier into which they are directed by a new mechanical plaiter, consisting of an upper funnel shaped vessel suspended in an universal joint and a lower part composed of several telescopically sliding copper tubes, the whole roughly resembling the outline of an elephant's trunk. The goods after passing over a drum are washed into and through the funnel shaped hopper by a flow of bowking liquor drawn up by a pump, see E in Fig. 1. The plaiter hanging in the universal joint is moveable in every direction and the goods can be guided to any desired position. The flow of liquor falling into the kier from a considerable height at the same time with the material, effectually envelopes the latter, completely saturating it and an air pump connected to the bottom of the kier exhausts the air and greatly facilitates tight packing. The entire operation is controlled by one workman who remains outside of the kier.

The Thies kier consists of 3 main parts, as shown at Fig. 1. The kier proper (A), an auxiliary boiler (B), for the purpose of alternately withdrawing the air and receiving the lye from the kier, and for preparing the new lye, and the superheater (C). Other accessory parts are (D), a condenser or water collector, and (E) a pump. The latter is of special design to ensure an absolute removal of the air from the kier. The boiler is an upright cylindrical vessel similar in size and shape to an ordinary kier, while the superheater is of the same height, but much smaller in diameter. The kier proper is provided with an extra large detachable lid and a lye spray fitted into the lid. Both are lifted by means of a rotating crane fitted to the kier. In the inside of the kier grates are inserted at the top and bottom in order to expose all surfaces of the cloth to the action of the chemical agents. The objects of the cylindrical sub-

*American Representative of Foreign Patents, 437 Fifth Avenue, New York.

structure of the kier is to create a difference of pressure above and below the load in order to intensify the circulation of the lye. For the circulation and transfer of liquors use is made of the pump.

When the goods are in the kier an iron ring grating is placed over them and over this the above mentioned lye spray and lid. The pump is then started to draw the liquor (lye recovered from previous bowking) from the boiler and force it in at the bottom of the kier, the blow off valve through which the air has been escaping having now been closed. By pumping the liquor from the boiler into the kier a vacuum equal to about 10 pounds is produced in the former vessel. A pipe connected with the throttle valve connects the top of the kier with the top of the boiler. The valve is now slightly opened so that a circulation of the liquor takes place while any air contained in the kier rises with the liquor, passes through the throttle valve into the boiler, where the liquor falls to the bottom and expands into the vacuum. The pressure in the kier is now gradually increased to 3 atmospheres by choking the valves, whereby any air remaining in the goods is mechanically dissolved out

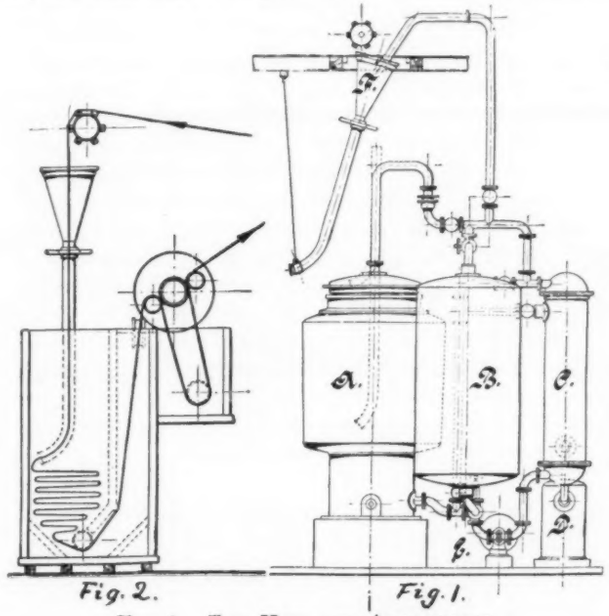


Fig. 1. The Kier and Accessories.
Fig. 2. The Mechanical Plaiter.

of the goods (air being more soluble in water under pressure) and transferred to the boiler. After the air in the boiler has been expelled steam is turned on in the superheater and the bowking continued for 2 hours at 45 pounds pressure. The used lye is now blown off by means of its own steam pressure. Fresh lye consisting of caustic soda at 6 to 7½ degrees Tw. and resin soap are now run into the kier (which is free from air), the pump set in motion again, steam turned on in the superheater and the bowking proper continued for several hours at 45 pounds pressure.

The process has the advantage over others that highly concentrated alkalis are used and the quantity of bowking liquor is very small compared to the quantity of the goods treated. By the special construction of the kier and other apparatus the air can be completely exhausted and the circulation of the lye is exceedingly lively and regular. Owing to the considerable difference in pressure above and below the goods, the liquor as a lather of small and very mobile bubbles passes with great energy through the entire load, so that even quantities of 22,000 pounds of goods are thoroughly permeated by it. The entire output of a large bleachery can therefore be taken care of in 2 kiers at a considerable saving in fuel, time and chemicals. The lye is used over and over again down to about 5 per cent of its caustic soda contents by utilizing it in the preliminary bowking. Even the last washing water which is only slightly alkaline, serves to carry the goods through the mechanical plaiter so that none of it is wasted. Being constantly brought in contact with clean material it retains its original amber color and its suitability for renewed bowking. Heat economy is likewise one of the features of the process. A specially designed reservoir collects all the condensed water in order to serve as wash water for the goods and by a special device the heat of the waste lye is completely utilized to heat the washing water and preheat the fresh lye. This means considerable fuel economy. The results claimed for this combination of improved bleaching apparatus are:

(1) A load is completed in 24 hours if the boiling is done by night; urgent work may be joined to the end of the preceeding load in the evening and is the first to come from the kier the next morning and is ready for further treatment in the forenoon. Rapid work obviates the necessity of carrying large stocks and means a saving in interest on working capital.

(2) The washing, chloring and souring treatment be-

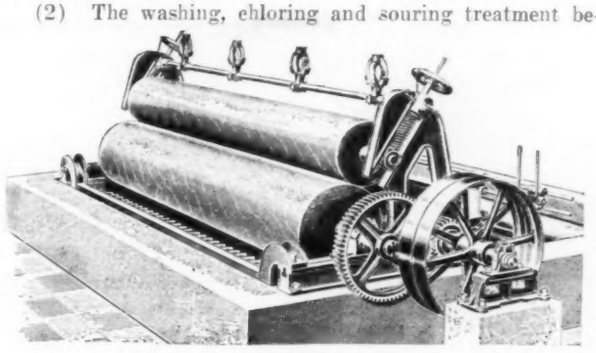


Fig. 3. The Washing Machine.

ing continuous does away with any intermediate handling of the material, and the first and last pieces are exposed for an equal length of time to the action of the chemicals. The material requires no intermediate storing and escapes the risk of irregularities resulting therefrom.

(3) The bowking produces an evenly bleached material owing to the uniform and thorough circulation of the liquor throughout every part of the kier and its load.

(4) The cloth remains always as straight as the thread owing to the special design of the washing machine and a carefully worked out method guiding the ropes in the bleaching. The material is stronger after bleaching than in the raw state. It can be stretched to a considerable extent in a longitudal direction if required or it may be so handled as to lose little or nothing in length or width.

(5) The bleached material is perfectly white; it is not sensitive to storage or direct light and retains its whiteness permanently. The alkaline and sour chlorination produces a white which after a year's storage makes material from the same bowking but not so treated appear yellow.

The bleached material is free from stains and streaks and in the subsequent mercerizing it takes the finish without difficulty; it is free from spots that resist water impregnation. A special form of construction guards against stains from boiling or chloring nor is there any risk of the cloth getting spattered by oil from the gearing.

For dyeing and printing it gives a full rich even shade with no stains, streaks or unevenness, and of a fulness as after slight mercerizing. It is fast to steaming and in mordanting and discharging gives an absolutely neutral white. The goods can be utilized as back cloths.

For napped goods the bleaching may preceed the napping under slight modifications. This has the advantage of increasing the weight of cotton, as the bleaching of napped goods entails a considerable loss in weight. It also gives a short, thick and uniform nap.

The economical advantages claimed for this process consist in reducing the cost of bleaching because the cheapest kind of alkali, carbide or soda is used; fresh alkali is only required when the old material has lost all its strength through being used over and over again; the cheapest kind of acid, sulfuric acid, is used; being applied hot the acid consumption is low; chlorine is used in smaller quantities than with other processes as the treatments before chloring are very thorough in their action; chlorine solutions being applied warm are fully utilized; fuel consumption is very low, most of the heat otherwise lost in boiling being recovered; the volume of liquid to be heated is considerably less than with other methods; the bowking liquid circulates for a shorter time than in most systems of high pressure bleaching; heat loss, due to radiation is reduced to a minimum; and labor cost is greatly reduced, loads from 4,000 to 20,000 pounds require only from 4 to 9 workmen.

It will be seen from the foregoing that the method relies chiefly on the bowking process under application of highly concentrated liquor thereby shortening the period of souring and chloring which can work with a liquor of greater dilution. Oxigen and hydrogen in the air are completely removed from the kier which not only prevents the formation of oxycellulose but clears the way for a more effective action of the lye on the material. Upon leaving the kier the material is not the usual brownish-yellow or cream color but an almost pure white, requiring but slight chloring. This saves the strength of the fibre and the expense for chemicals is reduced. Using highly concentrated liquor at the start prevents the formation of stains on the surface, the entire load is evenly bleached, wets out well and is evenly receptive for dyes. Tender steam colors become clearer and more uniform, mordants give a purer white, better suited to chemicking, anilin black and azoes give richer and fuller shades. The equal feeding into the kier of large loads of very different texture and the arrangement of the concentric gratings with large openings insures a perfect percolation through all parts. The difference of pressure above and beneath the goods makes it certain that no part of the goods are left without being boiled. The design and practical arrangement of the kier greatly facilitates the working and supervision of the plant. Easy control is ensured by the pyrometer and pressure gauges and enables the works manager to get at all times a clear view of the process by diagrams, and losses through overboiling owing to insufficient liquor are impossible.

In using the mechanical plaiter, one man or boy standing on the platform around the kier manipulates this apparatus and is enabled to stow the goods perfectly into any part of the kier. Formerly, unevenness frequently occurred from a workman remaining too long in one place in the kier. Unless the work was done with great care the lye was apt to make its path along the way of least resistance, that is along the walls of the vessel, leaving the material untouched and thereby producing stains. To partly mitigate these evils the time of boiling had to be extended. As the workmen remain outside the kier, accidents as a result of carelessness in opening valves cannot occur. The chemical action of the dissolving liquor commences already with the charging, which is done very rapidly. Goods cannot get tangled and after completion of boiling they can be removed without difficulty. In these ways the mechanical plaiter saves time, steam and chemicals and is an essential part in the kier installation.

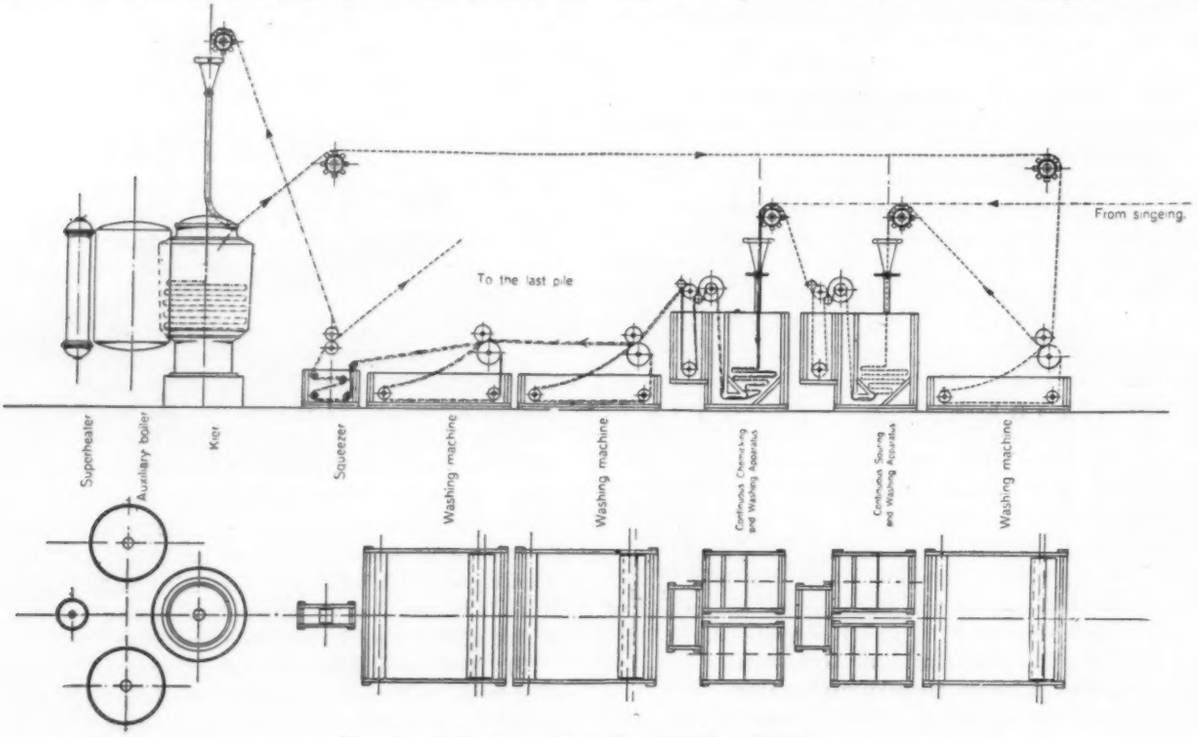


Fig. 4. A Layout for a Sixteen-Ton Plant.

With the souring and chloring processes hitherto used neither particles of matter left from the raw cotton nor those precipitated from the kier liquor could be absolutely removed by one single chloring in any alkali solution. Such defects are usually patched up by the so called blueing process. Pure and fast whites obviously cannot be obtained in that way. By double chloring both kinds of defects are entirely removed and a beautiful pure and fast white results, fast to dyes or any other kind of colors during steaming and also permanent during storage. It results in a saving of labor and chemicals and it takes less space and money to install doing away with numerous tanks, tubs, vats, cisterns, etc. The new slack washing machine described will take care of quantities of from 20 to 30,000 pounds per day.

DYEING RAW COTTON AND YARNS WITH SULPHUR COLORS.

(*Contributed Exclusively to* Cotton)

BY A. F. MUSGRAVE.

Sulphur colors are extensively used for producing colors fast to light, washing and crossdyeing on raw cotton, yarns and pieces. While not as fast as the vat colors, which at present are the latest products in fast colors, they are considerably better than after treated or developed colors. One great point of superiority of the vat colors over sulphur colors is their fastness to chlorine. Sulphur colors have a very poor fastness to chlorine but are not affected by stoving.

The cost of dyeing sulphur colors compares very favorably with the developed colors. Except for very exceptional fastness requirements the vat colors are too expensive as yet. The method of dyeing sulphur colors does not leave the stock in as good condition as developed colors do and for this reason, on mercerized yarns it it preferable to use developed colors if possible. Sulphur dyeings should be given a good softening to correct the hardening property of the sulphide.

Any material dyed with sulphur colors must be given a good washing after dyeing. A little free sulphur left in the goods will eventually oxidize to sulphuric acid and cause a tendering of the goods. Four good rinses will not be a waste of time.

One bad feature of the sulphur colors is their great shade change on oxidation. This of course requires practical experience to determine. Certain of the colors may be oxidized in a bath of sodium perborate. This causes a full oxidation at once.

At this point I will give a few tests which will be of great assistance in identifying sulphur dyed goods.

(I) Boil a clipping in 50 per cent by volume ammonia. If the color bleeds badly it is evidently not a sulphur color, but either a direct or after treated color. If the sample does not bleed try the following test.

(II) Boil a clipping with tin crystals and hydrochloric acid in a test tube. A filter paper moistened with lead acetate solution is placed over the mouth of the tube. A black or brownish metallic spot shows that the sample was dyed with sulphur colors. On light shades this test is not always satisfactory and the following may be tried.

(III) Sulphur colors are totally destroyed by chlorine but are brought back to the original shade on oxidizing with potassium bichromate. Direct or developed colors are destroyed but are not brought back by oxidation. Vat colors are generally fast to chlorine.

Of course bright reds and scarlets are not sulphur colors, there being no bright reds or scarlets in this group of colors. Certain of the vat reds as Thio Indigo Red B may be dyed in a sulphur bath but are seldom used in this manner.

Sulphur colors are generally dyed in a standing bath as the color does not exhaust. Lesser quantities of color, sulphide, soda and salt are used in the second and third baths.

The assistants used in the dyeing of sulphur colors are; sulphide of soda, soda ash or caustic soda, glauber salt or common salt and sometimes turkey red oil or monopol oils. Sulphide of soda is sold in two forms, the crystallized product containing water and the fused product. The fused sulphide comes in irregular grayish lumps and has twice the strength of the crystals. It is considerably easier to handle, saves freight, does not deteriorate as rapidly and produces more level dyeings than the crystals.

The sulphide is used to dissolve the insoluble sulphur dye and the quantity needed varies for different colors. A slight excess has no harmful action but a deficiency causes dyeings which rub badly. For blacks about 1½ times the weight of the dyestuff must be used. This refers to the concentrated sulphide. As sulphide of soda has a corroding action on brass or copper, only wooden or iron vessels should be employed.

Soda ash or caustic soda is added to the dye bath to neutralize the sulphur acids formed. The hydrogen sulphide formed is changed to sodium sulphide by the alkali. Either ash or caustic may be used but in the majority of places soda ash is preferred. Very little soda is needed after the first bath.

Common salt or Glauber salt have no chemical action in the dye bath and are merely used as precipitating agents. Salt should not be used to excess and after the first two dyeings practically none is needed. Either salt may be used, but common salt is cheaper. For blacks the liquor, when cold, should test around 8 degrees Tw. An excess of salt will produce "bronzy" dyeings.

On making an addition of color to a standing bath always dissolve the color before adding. With a large amount of salt in the bath it will be difficult to dissolve the color if put in the bath dry.

After the dyeing process, which usually takes from one to two hours, is completed, three or four good rinses and a soaping should always be given. For this soaping 3 per cent soap and 2 per cent turkey red oil at 140 degrees will be found sufficient.

The dyeings are sometimes after treated with metallic salts to increase the fastness to both light and washing. Brighter shades are produced by topping with basic colors in the same manner as direct colors are topped. Certain of the basic dyes may also be added direct to the dye bath. Basic colors will of course cause a decrease in the fastness of the dyeings produced.

In dyeing light shades with sulphur colors, difficulty is sometimes experienced in obtaining level dyeings. An addition of 2 per cent of turkey red oil and a slightly increased amount of sulphide of soda will generally help in this respect. Of course an excess of salt tends to produce uneven dyeings. Dyeings which are too dark may be lightened by boiling in a fresh bath with a little sulphide of soda. It is well in dyeing sulphur colors to keep as concentrated a bath as possible. This of course holds true of all colors which do not exhaust.

CHINA CLAY.

The London Statist relates that "china clay, which is used for the manufacture of paper, for bleaching, in the ceramic arts and the textile industry, was, a short while ago, described by R. T. Bayliss as 'the sole industry which the British have exclusively in their hands.' He was not quite right. It is true that we have the bulk, the virtual monopoly of the raw material, but the industry in connection with it is carried on in several other countries, of which Germany is the best known.

"The china clay trade hitherto has been almost entirely in private hands, but it is likely that more attention will be given to it in the future. More than 150 years have elapsed since china clay was discovered a few feet below the surface at Carclaze, St. Austell, but today this product is put to many and various uses in the arts, mixed with other clays for pottery and porcelain, in many materials as a dilutant, and in paper, textile linoleum, ultramarine and other manufactures to a considerable extent.

"The demand for and the large profits obtainable from the marketing of china clay is a matter of common knowledge to the people in mid-Cornwall especially. There are probably some 100 merchants in Cornwall in the three generations who have made great fortunes from the industry. The demand for the commodity is fast increasing by virtue of its more extensive use in all phases of life, and the spread of civilization, so that not only is there a regular market, but a market for additional output.

"A considerable quantity is produced in Devonshire, smaller supplies are found in Dorset and Brittany, but by far the greater part of it comes from Cornwall. Although its real value was not declared until 1768, it was discovered several years before, *viz.*, in 1756 by William Cookworthy—but the deposits in Cornwall were not actively worked to any extent until 1840, the beginning of increasing commercial demand. The importance of the industry to the adjoining Cornish towns and districts consists in the fact that their prosperity is chiefly due to china clay production.

"The selling price of first-quality high-grade is about 28s. per ton, cost of production less than 12s., profit 16s. per ton. An average price for all grades is about 19s. per ton. The cost of production, although now higher, is still low, and avariciously proportionate to its market price.

"Devon and Cornwall undoubtedly have the monopoly of the world's supply, particularly so of the high-grade class, *viz.*, the pure white clay. Is is strange, too, that Norway is not a serious competitor with this as with granite. One-third of the entire output of England is taken by the United States of America, a proportion of the remainder being taken by all European countries, and a small but increasing quantity by our colonies.

"Numerous sailing vessels are always at the ports of Par and Fowey, and steamers up to 7,000 tons dead weight have loaded at the latter port, about 400,000 tons being shipped for the year to September 30 from this port alone. The exports of manufactured clay last year to foreign countries was about 693,000 tons, to the British colonies about 58,000 tons, making a total of 751,000 tons. This is an increase of 14 per cent over 1909 and 6 per cent over 1910. Some forty years ago it totaled 160,000 tons. Foreign countries, however, have not sent us manufactured pottery to an equivalent extent of increase. It is true that Germany and Austria are no fool competitors. They work longer hours for smaller pay and get the china clay practically as cheaply as does Staffordshire. Many of their ornamental articles, teapots, egg cups, etc., are sold here cheaper than our own make. Possibly, they are not so good or so well glazed. The world's demand for pottery having enormously increased in recent years, it cannot be expected that British pottery should always share proportionately in the supply.

"Contracts for the finer grades are fixed several years ahead, the requirements in this connection being much greater than the available supply. Common grades find a ready sale and are generally well sold in advance, but these are subject to trade vicissitudes at times, although there is little play in price for specific grades.

"Now what is china clay? Kaolin is anhydrous silicate of alumina. The clays found in most localities contain sufficient iron to color them red or buff when burned in a kiln, but china clay is to all intents and purposes a pure white before and after firing. This, together with its refractory nature, makes it the essential element of porcelain. Kaolin is a product of the decomposition of the feldspar of granite rocks. The term kaolin is derived from Kaoling ('high ridge'), the name of the hills near King-tik-chin in Chiang-hsi, a chief seat of the porcelain manufacture of China. Clay was sent from this district by Jesuit missionaries about 1720, a little later came the discovery in Saxony, and subsequently in Cornwall, the latter soon taking pride of place. Common clay is a mixture of china clay and the fine powder of some feldspathic mineral which is anhydrous and not decomposed. Clays vary much in plasticity, and some were eaten by savage tribes. We shall not yet be surprised to see synthetic china clay made from shale or laminated rocks, argillaceous rocks or other substances, in the case of need, but it cannot be done more cheaply.

The method of obtaining English china clay is simple and requires no great technical skill. The clay is found in beds, usually of the basin shape, between the granite hills. It is usually covered by what is known in the trade as overburden, varying from six to forty feet. The overburden is removed, a pit is formed, a shaft is sunk, as a rule outside the bed in more solid ground, but conveniently near; an adit-level is driven from the shaft into the bed of clay, a stream (or streams) of water is turned on to the top of the pit and runs down over the face or stope of clay. Workmen, who usually wear rubber boots, stamp about in the pit on the clay which is dislodged by the water. The clay then flows through a 'buttonhole' launder at the bottom of the pit into the level before referred to, that level having a slight decline into the shaft. It is then pumped up together with the sand to the top of the shaft, and from hence passes through mica drags, where sand and the micas or any other impurities fall by natural gravity, being heavier than the clay, the clay itself, in solution, flowing into settling tanks. From these settling tanks the surplus water flows off and the clay is then trammed, though in some cases it is raked to the bed of the kiln or 'dry,' where some 70 per cent of the moisture is extracted. It is then cut into blocks of one foot or eighteen inches long by six or nine inches broad and two or three inches thick, and in this state is put on railway trucks and shipped to port."

"The principles of courtesy are absolutely essential to a successful salesman; without them, advancement is surely blocked. Those engaged in selling cannot fill responsible positions acceptably if they fail to practice the principles of courtesy."

Practical Problems Discussed by Cotton's Readers

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so indorsed. This department is open to all.

MAKING BALANCE TWIST.

Editor Cotton:

Replying to the question of "Y. L. Y." and "W. C." concerning "Balance Twist" in the November, 1912, and February, 1913, issues of Cotton, I will suggest the following methods:

In making ordinary 8's three-ply yarn, standard warp twist, the twist calculation for the single yarn would be $\sqrt{8}$'s $=$ 2.8284. 2.8284 $\times$ 4.75 $=$ 13.44 standard warp twist for 8's single yarn.

For the double yarn the writer would make the following calculation. First find the resultant count for the three-ply yarn as follows:

$8 \times 8 = 64$. $64 \div 16 = 4$.

$4 \times 8 = 32$. $32 \div 12 = 2.66$'s resultant number, which, as will be readily seen was found by multiplying the first two counts together and dividing the result by the sum of the two counts. This gives the count of the first two twisted together. With this count multiply the other strand and divide the result by the sum of the latter counts. Then take the resultant count, 2.66, and extract the square root of same which is 1.63. Multiply this result by the standard multiple 4.75, which gives 7.72 turns per inch in the doubled yarn.

An easier or shorter way to determine the resultant counts is to divide the number of yarn by the plies in the yarn. Thus $8 \div 3 = 2.66$. $\sqrt{2.66} = 1.63$. $1.63 \times 4.75 = 7.72$.

Sewing twine is one yarn that in all cases must balance to give satisfaction. And it will at once be seen that if it does not balance it will kink and thereby cause knots to form which in turn will break the needle of the machine upon which it is used. To determine whether or not a yarn is balanced pull off a strand of about a yard in length, and hold it down in a loop, if it hangs "dead," and does not "kink up" or twist either to the right or left it is balanced.

The twist referred to by "X. Y. Z. A." would not balance neither would the twist to be secured from the calculations just given balance. In all numbers to be plied and to be "balance twist," *the twist in the single yarn must be excessive in proportion to the twist in the ply yarn.*

A stated twist multiple is seldom seen on the face of an order for "balance twist," as the buyer does not care what twist is put in the yarn, just so it balances and comes up to the standard in strength and counts for that specific yarn. He knows that the spinner has to take the conditions as they are and use a twist that will balance.

The writer once had an order for 60,000 pounds of 8's three-ply sewing twine and the parties made special request that this yarn should be of "balance twist." Owing to the fact that no theoretical rule for such yarn was known, experiments had to be made to arrive at just what was wanted. These experiments proved that 18.50 turns of twist in the single yarn and 7.20 turns in the ply yarn to be exactly what was desired.

Since that experience whenever an order came in for a sewing twine in balance twist, I always figured the twist in proportion to what I actually found to be right in the former order of 8's three-ply. If a much finer number of yarn was ordered such as 10's, 12's, etc., for each two numbers on the fine side, I made it a practice to insert two extra turns in the single yarn, above the figures calculated in proportion to the 8's.

In the making of balance twist there are a few things that must be watched. And should receive careful attention. The spinner should in all cases constantly watch his work and see that the numbers do not get too heavy or too light, as the case may be, always bearing in mind the number he is making, for if the work becomes too heavy the twist will not balance; and *vice versa*. Care should be taken that the yarns do not get mixed on or around the spoolers, for it will be a difficult matter to detect 8's sewing twine single yarn from 8's warp. A good experienced eye is required and if the yarn does get mixed you are sure to get a kick from the buyer.

Shrinkage in the yarn on the twisting machine has a lot to do with balance twist. If you allow the yarn to shrink, you will surely have trouble. It is the best policy to use just as heavy travelers as can be used on each number of yarn, as the traveler has a great deal to do with the "shrinkage" in the yarn. The heavier the traveler, the less the "shrinkage."

As has been stated sewing twine is usually ordered to be balance twist and it is also generally ordered to be wound on cones and of the "Universal" wind. In winding sewing twine the ends must not be tied as the knots would break the needles of the machine upon which it is used. The usual practice is to lap the ends in the winding process.

I hope the few points I have made will be of help to "W. C." and others, and I will be glad to see the subject discussed further. In conclusion I will state that the following twist multiples are recommended for balance twist sewing twine.

For single yarn, the square root of the number multiplied by 6.55.

For doubled yarn, the square root of the resultant count multiplied by 4.42.

H. X. S. (Georgia.)

The second meeting of the Southern Sociological Congress will meet in Atlanta, April 25th to 29th, 1913. The purpose of this congress is to study and improve social, civic and economic conditions in the South. They announce that 78 specialists are to be on the program and to speak on questions of the hour. This congress was inaugurated in Nashville, Tenn., in May, 1912, at which conference there were delegates in attendance from 22 states. All persons interested in the work of this congress are cordially invited to attend this meeting in Atlanta.

THAT BALANCE TWIST PROBLEM.

EDITOR COTTON:

The term "Balance Twist" does not seem to have the same meaning everywhere as in your March issue there are the following three definitions:

1. "Balance twist yarn is a yarn that has the same amount of twist in the single as in the twisted yarn."

2. "Balance twist is usually understood to mean that the single and ply yarns will have the same proportional amount of twist."

3. "Balance twist means that twisted yarn should have just enough twist in it, to keep it from twisting or curling up."

I have been brought up on this third definition. In order to differentiate these three definitions, I would suggest calling them as follows:

1. Equal or same twists.

2. Theoretical balance twist, or same proportional twists.

3. Actual balance twist or "dead twist." Something of this sort is necessary to avoid confusion and misunderstandings.

In the February, 1913, issue, my questions contained some typographical errors, which mislead "X. Y. Z. A." somewhat in his answer in the March issue. I should like to restate the first problem and give the actual practical answer and then see if any of the readers of COTTON can give me any approximate rule for finding this answer.

First of all, by "balance twist," I mean a twist that hangs "dead, *i e*, the twist in the single yarn balances the twist in the ply yarn. The problem is: If we put 18 turns of right-hand twist into a single 23's combed Egyptian yarn, what number of turns of left-hand twist must be put in this yarn when it is plied up into an 11 ply 23's yarn, so that the two twists will balance? The answer is from 3.70 to 3.80 turns.

"X. Y. Z. A.," in answer to my second question in the February issue, works out a multiple which if used to multiply by will not give the actual answer. The second problem was: If there are 18 turns in 16's single, (right-hand twist), what number of turns in the ply will balance this single twist, if it is made into a 5 ply 16's yarn (left-hand twist)?

Taking "X. Y. Z. A.'s" multiple 4.50 and subtracting 20 per cent (for some reason, he does not state what), and we get 3.60. What do you do with this multiple? $3.60 \times 3.20 = 11.52$ and, if this is his answer, it is not correct. The real number of turns in the ply to balance this single twist is about 5.25 turns of twist.

These problems which I have given are harder than they appear and I have not found any rule for getting this "dead" twist, and some of the best men in the business know no more about it than I do. As "X. Y. Z. A." says, moisture is one variable that makes this a hard problem, but it does seem as though there should be some approximate means of calculating this "dead" twist, except by actually twisting the yarn.

W. C. (Massachusetts).

"Patience is a most necessary qualification for business; many a man would rather you heard his story than granted his request. One must seem to hear the unreasonable demands of the petulant, unmoved, and the tedious details of the dull, untired."

YARN AND CLOTH CALCULATIONS.

EDITOR COTTON:

To find the average counts of yarn in any piece of cloth when the threads per inch, picks per inch, width in the reed and number of yards per pound are known:

Add together the yards of both the warp and filling, after adding a certain per cent to warp. For size, divide by 840, multiplied by the pounds contained in the piece. Example: A cut contains 100 yards of the following goods 36 inches, 56 by 60, 4 yards per pound. Supposing the goods to be woven 38.5 in. wide in the reed and the warp having taken up 5 yards in weaving and consumed 8 per cent of size, what is the average counts of yarn?

To find the number of yards of warp multiply the ends by length of cut at slasher with the percentage of size added and the result is the length of the warp.

To find the number of yards of filling, multiply the picks per inch by the width in the reed and by the yards contained in the cut of cloth. The result is the yards of filling.

To find the weight of the cut, divide the length in yards by the yards per pound, and the result is the number of pounds contained in the cut of cloth.

To find the ends in a warp, multiply the width in inches and add the selvage.

In the example given, proceed in the following manner: $56 \times 36 = 2016 + 24 = 2040$ ends. $2040 \times (105 +$ 8 per cent for size) $= 231{,}336$ yards of warp. $60 \times 38.5 \times 100 = 231{,}000$ yards of filling. $231{,}336 + 231{,}000 = 462{,}336$ yards of warp and filling. $100 \div 4 = 25$ pounds or the weight of a cut of cloth. $462{,}336 \div 840 \times 25 = 22$ average counts of yarn.

Suppose we make our warp 21's, what counts of filling will it take to preserve the number of yards per pound? To find the proper counts of filling to preserve the yards per pound: Subtract the weight of the warp from the weight of a cut of the cloth and the result is the pounds of filling required. Multiply the pounds of filling by 840, and divide that into the yards of filling contained in a cut of the cloth, the result thus obtained is the counts of filling necessary to preserve the yards per pound. Divide 231,336 yards of warp by 840 multiplied by the counts of the warp, in this case 21's and we get 13.11 pounds of warp. If a cut of the cloth will weigh 25 pounds, then $25 - 13.11 = 11.89$ pounds of filling. Then, as the number of yards of filling is 231,000, we have $231{,}000 \div 840 \times 11.89 = 23.13$ counts for the filling to preserve the yards per pound.

In the system of numbering cotton yarn, all counts are based on the standard of 840 yards, which is known as one hank, or we will say a hank of cotton contains 840 yards. In one pound of No. 1 yarn there are 840 yards. In one pound of No. 2 yarn there are two times 840 yards, which is 1680 yards. If 1680 yards weighs one pound, what count is it? 1680 divided by 840 equals number 2's yarn. If 17,640 yards weighs one pound, what is its number? 17,640 divided by 840 equals 21's yarn. To find the number of cotton yarn by its weight in grains, multiply the length in yards by 8⅓ and divide by its weights in grains.

TABLE.

1½ yards = one thread or circumference of reel.
120 yards = 80 threads = 1 skein or lea.

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Boston Office
65 Franklin Street

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COTTON MACHINERY

Opening and Picking Machinery

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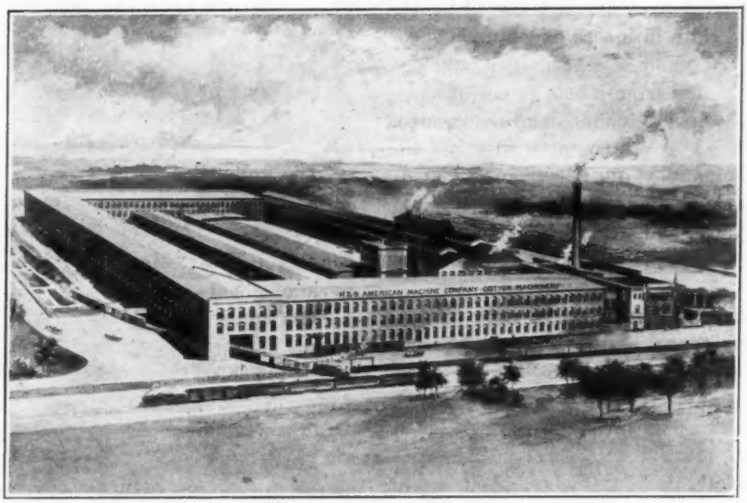

Spinning Room Machinery

Twisters for Wet or Dry Work

With Band or Tape Drive

H. & B. AMERICAN MACHINE COMPANY
PAWTUCKET, R. I.

840 yards = 560 threads = 7 skeins or leas = 1 hank.

437½ grains = 1 ounce.

7000 grains = 16 ounces or 1 pound.

If 120 yards are reeled, divide its weight in grains into 1000 and the result thus obtained is the counts of the yarn. To find the counts of the yarn on a beam which has only one size of yarn, the weight, length and number of ends being known, we use the following rule:

Length × ends ÷ weight in pounds × 840 = number of the yarn. Example: The warp contains 2040 ends, 105 yards on the beam and weighs 12.14 pounds, what is the counts? 105 × 2040 ÷ 12.14 × 840 = 21's yarn. To find the number of ends on a beam when weight, length and counts are given: Divide the weight of yarn × the counts × 840 by the number of yards of yarn, and the result = the number of ends. Example: The number 21's yarn on the beam weighs 12.14 pounds, each end measures 105 yards, how many ends does a beam contain? 12.14 × 21 × 840 ÷ 105 = 2040 ends.

To find the weight of a beam of yarn when the length of cut, the number of cuts, the number of ends and the number of the yarn are known. Rule: Ends × length of cut × cuts on beam ÷ counts × 840 = weight in pounds. Example: The beam contains 2040 ends of 21's cotton yarn. Each end is 105 yards long, or one cut, how many pounds of the yarn is there on the beam?

2040 × 105 × 1 ÷ 21 × 840 = 12.14 pounds.

To find the length of each end of warp yarn on a beam when the weight, number of ends and number of yarn are known. Rule: Weight in pounds × 840 × counts ÷ number of ends = length of yarn. Example: Make 2040 ends of 21's yarn that will weigh 12.14 pounds, what will be the length of the separate ends? 12.14 × 840 × 21 ÷ 2040 = 104.97 or 105 yards.

It very often becomes necessary to use two different counts in a warp. When we find this to be the case, in order to figure for the average counts of the yarn, it is first necessary to determine the average counts of the warp. To find average counts of the warp when there are two or more counts used in the same warp: Divide the total number of ends of each count by its own count, add these results together and divide the result into the total number of ends. Example: Suppose we are to make a warp backed fabric with 672 ends, 16's counts, 365 ends 21's counts, what is the average counts of the warp?

672 ÷ 16 = 42. 1365 ÷ 21 = 65. 672 + 1365 = 2037. 42 + 65 = 107. 2037 ÷ 107 = 19.03's average counts of warp.

To find the average counts of filling in the cloth when two or more counts are to be used: Divide the number of picks of each count of filling by its own counts. Add the results thus obtained and divide that into the total number of picks per pattern in one yard of cloth. Example: A piece of cloth is constructed as follows: 56 × 60=36 average number of yarn 22's, how many yards per pound? 22 × 760 ÷ (56 + 60) × 36 = 4 yards per pound.

To find the yards per pound in the cloth from a small sample: Find its weight in grains. Divide the weight in grains by the number of square inches in the sample. Multiply the result thus obtained by the square inches in one yard of goods and the result is the number of grains in one yard of cloth. Divide the grains in one yard into 7000 grains and the result thus obtained will be the yards per pound. Example: A piece of cloth cut 3 by 4 inches from

cloth 36 inches wide and weighs 16.2 grains, how many yards will this cloth run per pound? $3 \times 4 = 12$ square inches in sample. 16.2 grains divided by 12 square inches = 1.35 grains per square inch. 36 inches wide multiplied by 36 inches in one yard equals 1296 square inches in one yard. 1296 multiplied by 1.35 equals 1749.6 grains in one yard. 7000 divided by 1749.6 = 4 yards per pound. Another rule, but somewhat shorter, is to multiply the number of square inches weighed by 7000 and divide by the weight in grains, width of cloth in inches and by 36. Thus:

$7000 \times 12 \div 16.2 \times 36 \times 36 = 4$ yards per pound.

To find the yards per pound from a bale or cut of cloth, divide length in yards by weight in pounds and the result is yards per pound. Example: A cut contains 50 yards and weighs 12.5 pounds, how many yards per pound? 50 divided by 12.5 equals 4 yards per pound. Example: A bale of goods contains 1600 yards and weighs 400 pounds, how many yards per pound? 1600 divided by 400 equals 4 yards per pound.

I will now give a form for making out a cloth analysis sheet. There are various forms that are adopted to suit the various classes of goods. However, this is a very good one for ordinary classes:

1.	Construction 56×60 — 36 inches, yards....	4.
2.	Style of cloth	56.
3.	Width of finished cloth	36.
4.	Ends in warp	2040
5.	Ends in one repeat	10.
6.	Number of repeats in warp	204.
7.	Picks per inch	60.
8.	Number of warp	21's
9.	Number of filling	23's
10.	Reed to be used	26.
11.	Harness to be used no shed	2.
12.	Width at reed in inches	36.
13.	Yards per loom per day	50.
14.	Price per cut	.15c
15.	Yards per cut	.50
16.	Pounds per cut	12.5
17.	Cost per pound weaving	.012
18.	Cost per yard weaving	.003

The following form makes a very good daily report form:

Date.

Blank for Weave Room. Daily Statement of Weaving.

Style of goods Total

Looms running

Looms stopped

Cause looms stopped

Cuts checked up

Drawn warp on floor

Remarks

(Signed).....

Overseer.

Pelham, (Georgia.)

NEW MACHINERY AND TRADE NOTES.

FACTS ABOUT NORTHROP LOOMS.

The use of Northrop looms in textile plants is constantly on the increase. This is clearly defined by a recent statement appearing in the January issue of *"Cotton Chats,"* the monthly house organ issued by the Draper Company, of Hopedale, Mass. This statement shows that including orders to January 1, 1913, there is in use and on order 240, 519 Northrop looms located in over 400 separate plants. We give below a list of a few of these representative mills in different parts of the country in order to show the wide variety of fabrics that can be woven with one shuttle and that are now being made on Northrop looms:

Androscoggin Mills, Lewiston, Me., seamless bags; Amoskeag Manufacturing Co., Manchester, N. H., denims, tickings and Amoskeag ginghams; Avondale Mills, Birmingham, Ala., print cloths and chambrays; Bates Manufacturing Co., Lewiston, Me., ginghams; B. B. & R. Knight, Providence, R. I., "Fruit of the Loom;" Boott Mills, Lowell, Mass., velvets; Bourne Mills, Fall River, Mass., sateens; Brookside Mills, Knoxville, Tenn., corduroys and velvets; Continental Mills, Lewiston, Me., pillow tubing; Cordis Mills, Millbury, Mass., tickings; Cliftin Manufacturing Co., Clifton, S. C., export sheetings and print cloths; California Cotton Mills Co., Oakland, Cal., towels; Chadwick-Hoskins Co., Charlotte, N. C., fine sheetings; Dallas Manufacturing Company, Huntsville, Ala., wide and narrow sheetings; Durham Cotton Manufacturing Company, East Durham, N. C., chambrays, ginghams and cheviots; Drayton Mills, Spartanburg, S. C., fine combed lawns; Dwight Manufacturing Co., Alabama City, Ala., drills, sheetings, etc.; Dwight Manufacturing Co., Chicopee, Mass, Dwight Anchor goods; Everett Mills, Lawrence, Mass., "Classic" (ginghams); Erwin Cotton Mills Co., West Durham, N. C., wide sheetings and denims; Farr Alpaca Co., Holyoke, Mass., alpacas; Fall River Iron Works, Fall River, Mass., print cloths; F. W. Poe Manufacturing Co., Greenville, S. C., dobby work; Grosvenor-Dale Co., North Grosvenor Dale, Ct., Masonville sheetings and sateens; Graniteville Manufacturing Co., Graniteville, S. C., sheetings and drills; Home Cotton Mills, St. Louis, Mo., bag goods; Johnson & Johnson, New Brunswick, N. J., Red Cross bandage and sanitary goods; Lonsdale Co., Providence, R. I., cambrics; Merrimack Manufacturing Co., Lowell, Mass., corduroys; Merrimack Manufacturing Co., Huntsville, Ala., lawns and print cloths; Massachusetts Mills in Georgia, Lindale, Ga., sheetings, drills and light ducks; Naumkeag Steam Cotton Co., Salem, Mass., Pequot sheetings; Nashawena Mills, New Bedford, Mass., fine and fancy goods; Otis Company, Ware, Mass., awnings; Pacific Mills, Lawrence, Mass., cotton department, Serpentine crepes and worsted department, worsted dress goods; Pell City Manufacturing Company, Pell City, Ala., denims; Pepperell Manufacturing Co., Biddeford, Me., drills and jeans; Rosemary Manufacturing Company, Roanoke Rapids, N. C., damasks and napkins; Republic Cotton Mills, Great Falls, S. C., print cloths; Riverside and Dan River Cotton Mills, Danville, Va., cheviots, chambrays, stripes and wide sheetings; Tremont & Suffolk Mills, Lowell, Mass., canton flannels; Utica Steam & Mohawk Valley Cotton Mills, Utica, N. Y., Utica sheetings; Victor Manufacturing Co., Greers, S. C., fancies; Whitman Mills, New Bedford, Mass., fine lawns, and York Manufacturing Co., Saco, Me., ginghams.

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Every building of the first class, every manufacturing plant, every railroad roundhouse and depot, every flat-roofed building, from a residence to a skyscraper, ought to carry a Barrett Specification Roof.

These Roofs have won their standing on the basis of past performances.

Their first cost is below that of any other permanent roofing; their maintenance cost is nothing; their unit cost is about ¼c per foot per year of service.

They last twenty, sometimes thirty years, without repairs or care.

They do not need painting, as metal and ready roofings do.

They take lowest rate of insurance.

For these reasons they are more popular than any other kind.

Copy of The Barrett Specification will be sent free on request.

Special Note

We advise incorporating in plans the full wording of The Barrett Specification, in order to avoid any misunderstanding.

If any abbreviated form is desired, however, the following is suggested:

ROOFING — Shall be a Barrett Specification Roof laid as directed in printed Specification, revised August 15, 1911, using the materials specified and subject to the inspection requirement.

BARRETT MANUFACTURING COMPANY

New York Chicago Philadelphia Boston St. Louis Kansas City Cleveland
Cincinnati Minneapolis Pittsburgh Seattle Corey, Ala.
THE PATERSON MFG. CO., Ltd.:—Montreal, Toronto, Winnipeg, Vancouver, St. John. N. B. Halifax, N. S.

TRADE B MARK

Clifford Shopbell Co., Architects.
St. Louis Roofing Co., Roofers.

H. Fendrich Cigar Factory, Evansville, Ind.

THE HOPEDALE MANUFACTURING CO.

The HOPEDALE MFG. CO., of Hopedale, Mass., was formed to improve and develop new features for the cotton mill. It has already started with an improved temple, which has many qualifications commending it to the trade. It has an adjustable feature to the bar which permits of the taking up of any wear and renders it more rigid and firm, making it correspond to a new temple in this respect at all times. Care is taken to furnish a quality of iron in the castings that will be in keeping with what the trade is expecting in this line. The design of the temple shows neatness and mechanical perfection and is along lines that have brought out much favorable comment. To successfully introduce temples, it is imperative to provide the temple rolls or burrs which grip the cloth and are the real life or essence of a good temple, and this has been successfully done. Being equipped to provide the temple complete, it admits of the furnishing of repair parts as applied to rolls, and where mills have used this company's product, there have been repeat orders and a gradual extending of this business as they have become better known. This company will gladly furnish rolls on separate order to accommodate any make of temple and will guarantee satisfaction.

Another feature adopted by this company was the manufacture of drop wires and heddles for repairs. When it was found that the demand for this work was comparatively limited, President Jonas Northrop, well-known to machinery users as being responsible for many improvements on automatic looms, with his usual facility in loom work, proceeded to design a warp stop motion. This warp stop motion has been running very successfully for some time, and is the subject of many kindly and favorable comments. The purpose incorporated in its design is to reduce the number of parts to the smallest possible, not only to give the mill the benefit, but to admit of furnishing a reliable mechanism at the lowest price. Its simplicity and efficiency are the most striking points, and its effectiveness in these important respects have appealed strongly to mill men. No warp stop motion, whatever its design or how thoroughly it has been perfected, approaches proper satisfaction without having absolutely good drop wires for its necessary complement. Much time and effort has been given by this company, to improve methods; the very best toolmakers, diemakers and die setters are employed; and special care is taken in finishing and inspecting. They are therefore producing a standard product so uniform in its quality as to make it appeal to all users.

The smoothness of finish on the drop wires go far toward producing a satisfactory warp stop motion and repairs or replacements upon drop wires are sought by this company. Where a mill is contemplating new warp stop motions of a mechanical type, it will pay them to investigate the claims outlined.

The officers and directors of the Hopedale Manufacturing Company, who are associated with President Northrop in the development and management, are as follows: Clare H. Draper, a member of the famous Draper family, who has always taken a large interest in textile machinery affairs, is the treasurer and guiding head of the concern; Harry T. Hayward, the vice-president, is prominent in mill circles and is a successful manufacturer of woolen goods; F. E. Norcross, the secretary, has been associated with textile machinery for a number of years, and is well informed upon the requirements of the trade; in addition, the directorate comprises of Charles A. Whiting, a successful manufacturer of jewelry, with interest in mills, and Charles F. Roper, whose name is well-known for developments upon automatic looms.

EMPLOYEES BECOME DIRECTORS.

The stockholders of the Crompton & Knowles Loom Works, at their anual meeting, honored nine of the oldest employees by electing them directors of the $3,000,000 corporation. This was done after the stockholders had voted to increase the number of directors from 11 to 20, which makes the directorate the largest of any industrial corporation in Worcester.

The new directors elected are: E. F. Green, E. E. Howard, John B. Syme, F. J. Bowen, Thomas T. Booth, F. W. Howe, I. H. Verry, A. A. Gordon, Jr., and L. B. Jenckes, all of whom have been in the employ of the corporation from 10 years upward, some for more than a quarter of a century.

The old directors re-elected are: Charles H. Hutchins, Frank P. Knowles, George F. Hutchins, Henry M. Merriam, Dr. Homer Gage, Lucius J. Knowles, George E. Warren, Charles M. Thayer, George Crompton, Charles F. Hutchins and A. K. Hutchins.

The board of directors met after the stockholders' meeting and elected the following officers for the ensuing year:

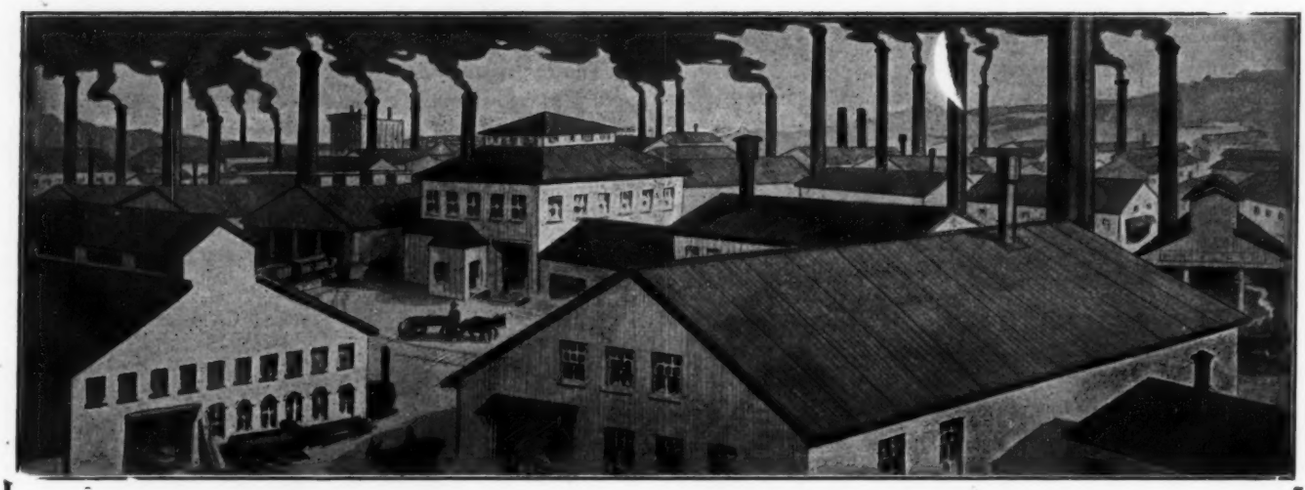
President, Charles H. Hutchins; vice-president and treasurer, Lucius J. Knowles; assistant treasurer, Edward F. Green; clerk, E. E. Howard; general superintendent, George F. Hutchins; solicitor, Charles M. Thayer.

Annual reports of the officers showed the year to have been prosperous financially.

Walter A. Nivling, general manager of the Industrial Starch Company is now touring the South in the interests of this firm. Mr. Nivling is consulting chemist of the Huron Milling Company, who manufacture special starches for the textile trade, sold through the Industrial Starch Company. He is favorably known as one of the expert starch chemists of the country.

The launderers of the Carolinas and Georgia are to meet in convention at Atlanta on April 29 and 30. In an interesting illustrated article on Atlanta, the March issue of that well-known journal for Southern laundrymen, the *Laundryman's Guide*, sounds the slogan of the coming convention. It forecasts a large attendance and an interesting program. Launderers and allied tradesmen everywhere are invited.

In 1911 the mercantile marine of Japan consisted of 31,600 vessels, of which 2,550 steamships are of an aggregate tonnage of 1,100,000; 6,400 sailing vessels and 22,650 junks. Compared with the previous year, this shows an increase in the number of 170 steam and 455 sailing vessels. Japan possesses two steamers of over 10,000 tons burden each, one of 9,400 tons, and six of between 8,000 and 9,000 tons. Twenty-four lines of steamers receive subventions from the government. The fleets of four of the most important of these lines represent a total tonnage of upwards of half a million.



THERE ARE OVER 300 IMITATIONS OF

RU-BER-OID ROOFING

Some of these imitations look like RU-BER-OID but that is merely on the surface. The roofing buyer cannot see what is underneath, or he would not be fooled in buying goods on their appearance only.

As a house built on a poor foundation cannot last, neither can a roofing founded on poor material give the service expected of it.

Take None but the Genuine

RU-BER-OID

Accent on the "RU" and always spelled with one "B"

Unless the RU-BER-OID Man is shown on the outside wrapper, the roofing is not the genuine RU-BER-OID

KA-LOR-OID
(Colored Ruberoid)
ROOFING

RED---BROWN---GREEN

The permanently colored prepared roofing

The ideal roofing for Bungalows, Cottages—in fact suitable for any building where artistic effect is desired.

The Standard Paint Company,

100 William Street, NEW YORK

BOSTON, CHICAGO, DENVER.

AN AUTOMATIC KNITTING MACHINE.

An entirely new hosiery knitting machine is known as the "Ames 5 in 1." The frame is of box type, is cast in one piece, which prevents the shafts from getting out of alignment. All bearings where necessary, are fitted with bushings, which can be replaced when worn, at small expense. The head is centrally located insuring perfect balance, and is fastened to the frame in a manner that prevents the bed plate from springing, which would throw the needle cylinder out of alignment. The cam cylinder is what is called the open type, and the butts of the needles can be seen at all times. It can be removed without disturbing the time of the machine. The guard cams are fastened to the outside of the cylinder. It has a skeleton ring which is self-locking. It is fitted with steel leaves hardened to a spring temper, which can be replaced if they should get broken. These leaves allow the skeleton to be made without reducing the bars at the top, and prevents breakage at this point, but should the bars get broken, the skeleton can be removed without removing the cam cylinder.

The sinker cam ring is also of the open type so that the sinkers can be seen in action. If asinker should get broken it will not tie up the machine. The sinker ring is fitted so that it can not rise and cause uneven knitting, and it is self-cleaning as is also the needle cylinder. Where screws are generally used in machines, pins have been substituted, driven up to a shoulder and riveted so that the troublesome feature of screws working out and getting lost is brought down to a minimum.

The measuring device is of the simplest construction doing away with all complications of gearing and dials, and all chains or loose parts which could cause trouble by falling off. It will measure the smallest to the longest stocking and is fitted with a device that enables the machine to be run either single or double feed, without changing the pattern, and the leg, foot, or ankle can be lengthened or shortened independently of each other.

The machine has a slow-down speed, eliminating shock when changing from rotary to reciprocating motion. The various adjustments for stitch regulation are independent and do not conflict with each other, all bobbins are stationary while machine is reciprocating. It is also fitted with other devices and attachments, all of which assist in producing a more perfect product. The machine is manufactured by the A. N. Ames Knitting Machine Co., Franklin, N. H.

Soluble Softening Oil, manufactured by The Arabol Mfg. Co., 100 William St., N. Y. City, is one of the most effective softening and sizing oils on the market. As a softener it surpasses tallow. Manufacturers like it because it is easy to handle, is always reliable and is not influenced by temperature. It gives a smooth finish to the warps, the threads divide well in the lease rods, and the cylinders of the slasher remain perfectly clean. It is neutral and most suitable for strong and close woven goods, such as corduroys, velveteens, sateens, twills, umbrella cloth, cambric warps, etc.

D. Everett Trask, the well-known textile expert who specializes in carding and combing, having completed his work in the combing department of the Atlantic & Gulf Mills, at Quitman, Ga., has accepted a similar position with the Utica Knitting Company, Utica, N. Y.

A DETACHABLE BELT FASTENER.

The responsible head in charge of the power equipment of every manufacturing plant has one principal purpose to attain which he keeps always before him, namely, to keep the machinery going. Among other necessary factors which form a part of this problem are reliable belt fasteners that may be quickly applied. Therefore men interested in the power plant and transmission equipment upkeep will be interested in the accompanying illustrations which

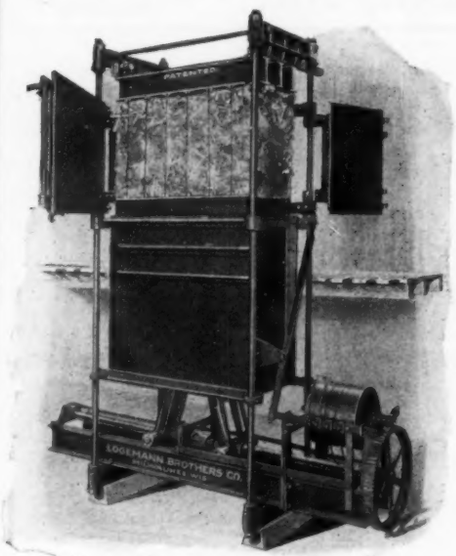
show a belt fastener which possesses many advantages that will be readily seen by persons familiar with the care of belts. This fastener is manufactured by the Snap Detachable Belt Fastener Co., 301 Market St., Newark, N. J. As will be seen, a separate plate is fastened to each end of the belt, and the ends are then conected by a sliding sleeve. This sleeve is shown in position on the plate as the belt rests on the pulley in one of the accompanying illustrations. This makes a strong flexible joint that can be quickly connected or disconnected by merely slipping the fastener from the sleeve. No tools are required to apply this fastener with the exception of a hammer, and in shortening a belt, either end may be shortened as the plates are interchangable. The detachable feature also makes this fastener very convenient when applied to overhad belts, inasmuch as it eliminates all work on step ladders, the entire fastener being applied at the bench and merely slipped together after passing the belt over the shaft. It locks automatically and can be used on both single and double belts of all kinds. These fasteners give excellent results on woven belts.

The Farbenfabriken of Elberfield Co., 117 Hudson St., New York City, are sending to the trade color cards describing their Chrome Fast Scarlet B. D. paste; and Rhoduline Blue 3 G O. This latter color yields bright blue shades when printed with tannin or dyed on a tannin-tartar emetic mordant. It gives very pleasing blue resists under aniline black. Dyed on a discharged tannin-tartar emetic mordant, this blue yields a pure white.

FRANKLIN W. HOBBS, THE NEW PRESIDENT OF ARLINGTON MILLS.

At the annual meeting of the stockholders of the Arlington Mills, William Whitman asked to be relieved from further service as president of the corporation. Mr. Whitman became treasurer of the Arlington Mills in 1867 and in 1902 was elected to the presidency, which office he has since held. Mr. Whitman will retain his active interest as a stockholder and member of the board of diretcors of the

ALL STEEL BALING PRESSES



Powerful
Noiseless
Economical
Fast
Last a Lifetime

Investigate our machines; they will pay for themselves in a short time. We guarantee more efficiency with less power than any other press built.

Over 50 Styles
Hand, Belt, Electric, Hydraulic

LOGEMANN BROTHERS CO.

280 Oregon St., Milwaukee, Wis.

Southern Representative, J. H. MAYES, Charlotte, N. C.

Cannot Rot, Split, Chip, Curl or Burn

Spring building revives that old sleep-disturber, "What roof?" Here's a thought for your consideration:

Wood shingles are simply leaky, short-lived kindling; and scarce at that; slate is heavy, fragile and waste begetting; why not, then, a roof that has none of these disadvantages?

CORTRIGHT METAL SHINGLES

"The Permanently Perfect Roofing"

are light in weight, fireproof, scientifically storm-proof; they last as long as the building, and never need repairs. There are many commendatory letters in our possession to prove this and more.

Get our free illustrated book "Concerning that Roof."
Ask us on a postcard—Today

CORTRIGHT METAL ROOFING CO., Philadelphia and Chicago

Arlington Mills and as senior partner in the firm of William Whitman & Co., selling agents of the Arlington Mills. He was succeeded as president by Franklin W. Hobbs, who has been connected with the corporation for 22 years and has served as treasurer for the past 11 years, and who will be the executive officer of the corporation and have general supervision and direction of all its affairs. Mr. Hobbs graduated from the Institute of Technology in 1889. He was the president of the National Association of Cotton Manufacturers in 1910-1912; is a member of the executive committee of the National Association of Wool Manufacturers; is a director of the New England Trust Co. of Boston and is associated with many other business organizations. A. H. Chamberlain was elected treasurer.

METAL INSURANCE.

Is this an unfamiliar term? Yet it is the thing to do and the live owners of property are adopting it throughout the country. If the rate for fire or life insurance is too low, you think twice before giving your risk to that company, as you doubt its ability to carry out its contracts under all conditions. If the rate is too high, you shun that company as an enemy of economy. A fair price for the best protection in a concern of reputation, is your motto, and ours, in writing you this homily. What are we driving at? Why, metal insurance by protective paint! Have a paint policy, Mr. Owner! Do not paint your structures spasmodically. Metal surfaces should be inspected regularly and a paint applied which will give the longest service, as you understand how it is possible to save in labor cost by infrequent repainting. Do not be deceived by the temporary allurement of a lower cost for paint of cheaper quality and resultant shorter service. A structure well painted is insured against decay and depreciation. Thus your property inventories higher and your profit and loss account stands you in more on the credit side. Never paint spasmodically; do not let your structure run down and then make a fruitless effort to bring it up to efficiency. This is a waste of money and hits you hardest at your weakest time. Use the best paint; make regular inspection; and paint with the paint that lasts longer—Dixon's Silica Graphite paint. It is made in four colors—one quality only, and is equally suitable for metal or wood. It is the world's greatest endurance paint and we can say no higher word for it than the leading railroads and manufactories have adopted it, after exhaustive tests, as their maintenance paint. Use it in the original packages. Nature's unrivalled mixture of the silica and graphite is alone mined by the Joseph Dixon Crucible Company, at Ticonderoga, N. Y.—*Graphite.*

MILL NEWS

Notices of mill projects, additions or Improvements are solicited for this degartment

ALABAMA.

CLANTON. It is reported that W. J. Mullins of Clanton and associates are to build a cotton seed oil mill at this place.

ANNISTON. It is reported that the Adelaide Mills are to add 1,600 additional spindles.

RAGLAND. Local reports indicate that Philadelphia capitalists were in Ragland recently organizing a company to build a cotton mill. A mass meeting was held and it was agreed to cap-

Manufacturing and Industrial Stocks

ISSUES WELL ADAPTED TO THE REQUIREMENTS OF CONSERVATIVE INVESTORS

Yielding 5 to 7 Per Cent

Send for our March Investmeut Circular

BOSTON 24 Milk Street **TURNER, TUCKER & CO., Inc.** NEW YORK 111 Broadway

italize the company at $50,000. A committee was appointed to take subscriptions, and it is expected that the necessary amount will be raised and the mill be under construction at an early date.

SYLACAUGA. The brick work on the new Eva Jane Mills has been started and a great deal of the building material is at hand. This mill will have a capacity of 40,000 spindles.

BIRMINGHAM. It is reported that the American Textile Company is organizing a sales agency for various lines of textile products.

CALIFORNIA.

SAN FRANCISCO. It is reported that the Gatner-Mattern Company have purchased a lot of land with the intention of erecting a four-story concrete mill.

LOS ANGELES. The Olympia Cotton Mills of Southern California, which was incorporated recently with a capital stock of $2,500,000, according to recent reports, proposes to erect a plant at San Pedro or Los Angeles harbor. This location was decided upon in view of the increased shipping facilities which would be afforded there upon the completion of the Panama Canal. It is reported that M. W. Durham will be at the head of the enterprise and control about a million and a quarter of the capital stock. This concern will manufacture both cotton and woolen goods.

GEORGIA.

COLUMBUS. It is reported that the Eagle & Phoenix Mills are to add considerable equipment, contracts for which have already been awarded.

SAVANNAH. Machinery has been received for enlarging the plant of the G. H. Tilton & Sons, of this place.

HABERSHAM. The Mason Machine Works, of Taunton, Mass., have recently received an order from the Habersham Mills, of this place, for two spinning frames. This increase in equipment will soon be in operation.

BARNESVILLE. The Collier Manufacturing Company announce that they will install additional knitting, finishing and bleaching machinery, and will also construct a new building, 50 by 150, two-stories high. This company manufactures ladies' high-grade knit underwear.

ILLINOIS.

CHICAGO. The Chicago Hosiery Company has been incorporated to manufacture hosiery, underwear, etc., at a capital stock of $5,000.

MARYLAND.

BALTIMORE. The Maryland Knitting Mills have been incorporated to manufacture hosiery, underwear and other knitted goods.

MASSACHUSETTS.

ROCKDALE. The J. G. Clark Company have erected an addition to the weave room and installed new looms and other machinery.

MISSOURI.

ST. LOUIS. The St. Louis Cordage Mills, which is a branch of the American Manufacturing Company, has contracted for the construction of two warehouses and a mill. These buildings will cost approximately $50,000.

NEW YORK.

NIAGARA FALLS. Work has started on the erection of an addition to the plant of the Niagara Falls Woolen Company, at Northend, recently.

NORTH CAROLINA.

KINSTON. It is reported that the Caswell Cotton Mills, manufacturers of hosiery yarns, are to increase the capacity of their plant to double its present size.

CHINA GROVE. Local reports state that A. L. Fatterson and J. S. Efird were in that place recently for the purpose of locating a site for a knitting mill.

CHAPEL HILL. The T. L. Lloyd Manufacturing Company are contemplating the erection of a 6,000 spindle mill, it is stated

KANNAPOLIS. The new Cannon Mill at this place began operation during March. This mill adjoins the other plant of the Cannon Company, and is operated in connection with it.

BESSEMER CITY. Three tenant houses belonging to the Osage Manufacturing Company were destroyed by fire during the past month.

LILESVILLE. The proposed new cotton mill that was recently reported in these columns had a stockholders' meeting about the middle of March and considered sites and plans for buildings. Railroad representatives were present, and arrangements were made to place side tracks to the proposed site of the building.

CLAYTON. The Liberty Cotton Mills, of this place, are adding 204 spindles.

ST. PAUL'S It is reported that the 10,000-spindle mill for making knitting yarns that located at this place is to be doubled in capacity.

CHARLOTTE. The new mill of the Thayer Manufacturing Company, being constructed at Law Creek, is progressing rapidly. The contractors expect to have the building entirely ready for machinery by the middle of this month.

GRAHAM. The Oneida Mills have recently purchased a ball-warping machine.

OHIO.

COLUMBUS. The plant of the Superior Underwear Company, at Piqua, is being altered and additions built that will more than double the capacity.

SOUTH CAROLINA.

GREENVILLE. It is reported that John B. Marshall is interested in plans for the organization of a company that will build a plant here to manufacture cotton goods, using mill waste as a raw material.

ANDERSON. The Conneross Yarn Mill has already begun construction on the additional building which was reported recently. The new addition will cost approximately $30,000, and the necessary machinery will be placed in same to consume 1,000 bales of waste annually. It is expected to add to this equipment later on.

BENNETTSVILLE. Recently the school district at this place found it necessary to erect a new school building near the cotton mill village, and as soon as plans were made for the erection of a suitable school building, the president of the mill, Robert Chapman, gave to the school district a piece of land and $300 toward the school building.

ROCK HILL. The Hamilton Cotton Mills have recently awarded a contract for the enlargement of their plant. The addition is to be an enlarged slasher room and will be equipped with new machinery.

TENNESSEE.

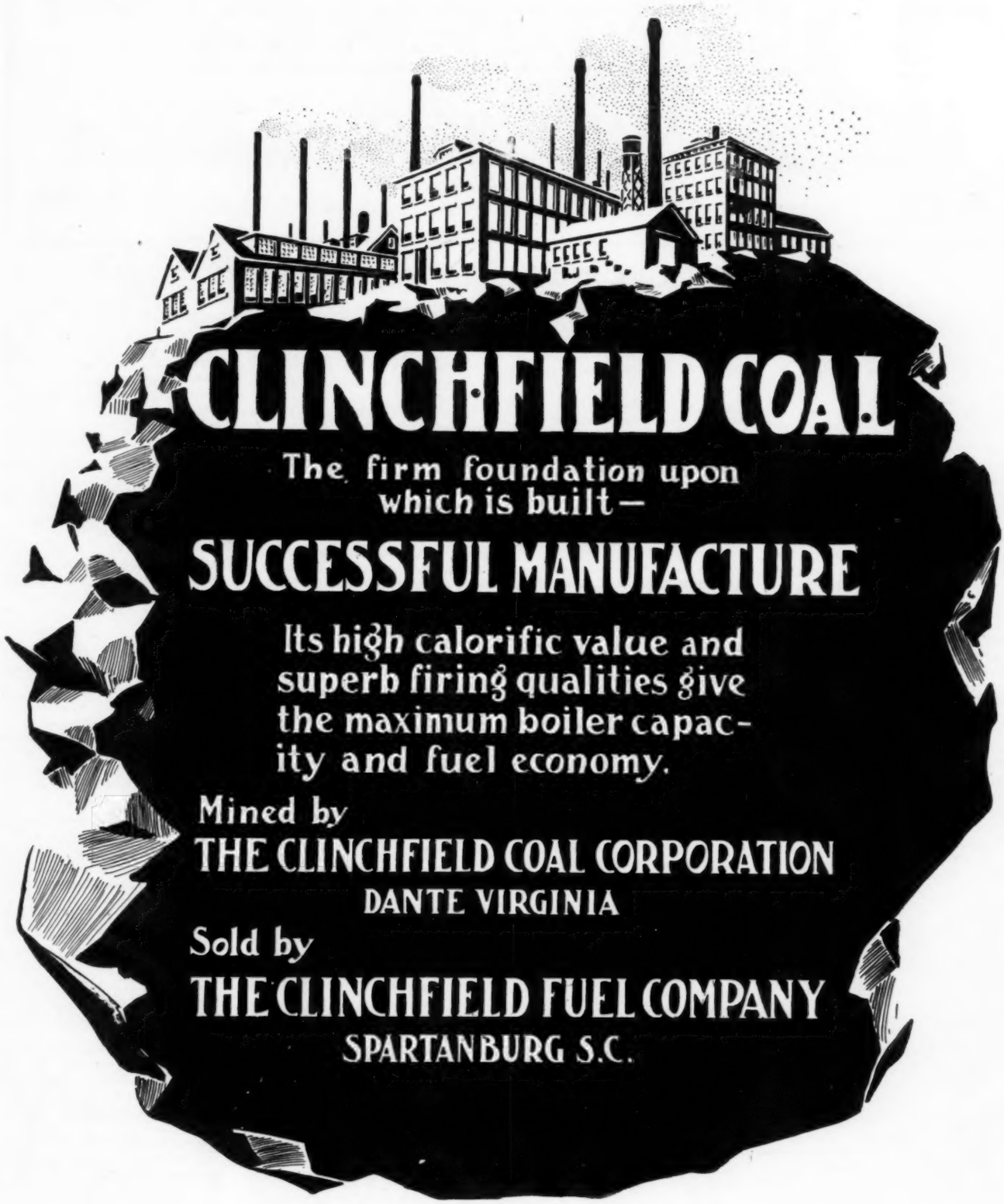
NASHVILLE. The Warioto Cotton Mills are to invest about $15,000 in the remodeling of their present buildings and erect an office structure. Plans and specifications have been prepared. This company operates 25,000 ring spindles, 700 looms.

ENGLEWOOD. The Englewood Manufacturing Company, of this place, have incorporated with an authorized capital of $50,000 for the manufacture of knit goods.

NASHVILLE. It is reported that Reeves & Ely Co., have recently incorporated to manufacture waterproof cloth.

MEMPHIS. The Memphis Cotton Manufacturing Company was recently chartered with a capitalization of $250,000. Of this it will invest $100,000 for the purchase of a site and erection of buildings, where it will install machinery for the manufacture of cotton goods from linter cotton.

WE give results
HALFTONE ENGRAVINGS FOR CATALOGS – COLOR PLATES – LINE ETCHINGS AND ALL OTHER PROCESS WORK.
SOUTHERN ENGRAVING CO.
ATLANTA, GA.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The firm foundation upon which is built—
SUCCESSFUL MANUFACTURE
Its high calorific value and superb firing qualities give the maximum boiler capacity and fuel economy.
Mined by
THE CLINCHFIELD COAL CORPORATION
DANTE VIRGINIA
Sold by
THE CLINCHFIELD FUEL COMPANY
SPARTANBURG S.C.

AMID TALLOW. (Made by the Amid Duron Co., for which we are selling agents). Recommended wherever one uses Raw Tallow in sizing. It combines readily with all starches and far more evenly than Raw Tallow; and 7 or 8 pounds will go as far as 10 pounds of Raw Tallow. It sells at the price of Raw Tallow, which means a saving of 25% to the consumer. It is neutral and non-odorous. See our U. S. patents No. 857141, 875655 and 915680; also our special leaflet describing this article. It is used not only in sizing, but in finishing also.

ARABOL MFG. CO.

100 William Street NEW YORK

SOUTHERN SALES AGENT

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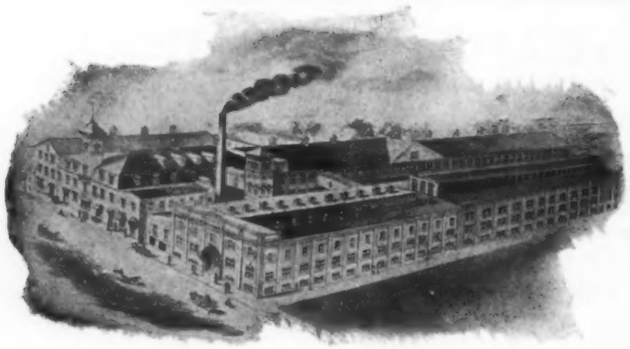

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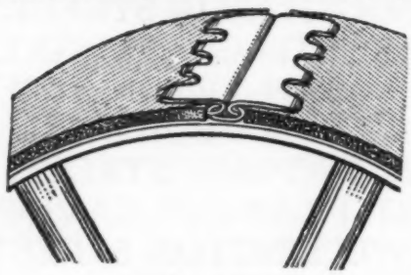
THE SNAP

Detachable Belt Fastener



Patented
July 30, 1912

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It is flexible	**It saves money**
It is safe and strong	**It saves labor**
It is easy to apply	**No tools required but a hammer**

Made for single and double belts. Put up in boxes 24 pieces, at the following prices:

1"	per box $ .24	2½"	per box $ .60
1½"	per box .36	3"	per box .72
2"	per box .48	3½"	per box .84
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Sent to you by Parcel Post. Give us a trial order and you will be convinced.

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Second-hand Cotton Mill Machinery
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In Skeins, Cones or Jackspools, double and Twist. ¶ I am also in the market for Ply Yarns; colored or grey, in skeins; could use mixed numbers. Amount unlimited.

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2 Hosiery Dryers.
1 Allen 40 Spindle Cop Winder.
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Offering Unexcelled Facilities for Placing all kinds of Colored Cottons as well as Sheetings, Drills, Print Cloths, etc., before the Jobbing, Cutting-Up, Converting and Export Trades.

We also have a REMNANT DEPARTMENT Conducted on High Class Lines.

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COTTON YARNS of all kinds and descriptions

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Eliminates all after-treatments.

Produces beautiful, bloomy, jet black, characteristic shade and imparts excellent handle and finish.

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A substantially constructed and well equipped Hosiery Mill in an aggressive Alabama city of 6,000 population, having a capacity of 550 dozen pairs of hose daily, is now offered for sale at a sacrifice price, due to inexperienced management and lack of sufficient working capital.

The property comprises 2½ acres of ground, several tenant houses, well constructed office, warehouse and factory buildings, equipped with 100 Mayo knitting machines, all necessary ribbers, loopers and sewing machines; 60 h. p. boiler and electric motor furnish sufficient power.

The plant is located on the main line of the
SOUTHERN RAILWAY
which affords excellent transportation facilities to all the large distributing centers.

The many orders now on hand, and the fact that future deliveries cannot be promised, show the good markets now existing for the factory's output.

This is an opportunity one will seldom find—a well established business, all equipment in first-class order, good location, big markets and a very low figure buys it all.

Refer to file No. 2495, and write for full particulars.

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Bay State Brick and Cement Coating

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known wherever a coating for concrete, stucco, or brick is used.

He's the trade mark not only of the best concrete, stucco or brick coating in the market, but of the WHOLE BAY STATE line of dependable paints, varnishes, enamels and stains that stand weather and wear.

Ask your dealer for them. If he cannot supply you write us for booklet P that tells about the BAY STATE line.

WADSWORTH, HOWLAND & CO.,
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Paint and Varnish Makers and Lead Corroders,
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will return that water in your steam lines to your boiler.

IF the amount of your steam line condensation is of any volume at all don't waste it. Send for a Morehead Trap and see how quickly the Morehead System will show savings in your coal bills, repair expenses, etc., not to mention the great improvements in your heating system.

From 20 to 40% of the heat units in the water of condensation is lost by cooling the condensation down to accommodate a steam pump.

Morehead traps return the condensation with its *full* heat content direct to your boiler with practically no drop in temperature.

MOREHEAD TRAPS are being used everywhere on Heating, Drying and Cooking propositions of every kind, from straight pipe work to fan stacks and under vacuum conditions without regard to the difference in pressure between the apparatus drained and that carried on the boiler and without regard to the location of the apparatus drained, whether above or below the water line in the boiler.

There is a Morehead Trap for any kind of service. Just state your conditions and ask for our proposition.

Address Cotton Mill Dept.

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Stocks Carried in
New York
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Put an Elevator Like this in your Mill

and you can always be *sure* of Elevator Service.

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Direct Connected Elevators
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The fifty-seven years' experience back of our product — together with the relentless inspection to which every Elevator is subjected before it leaves our shops—is your guarantee of an Elevator that will run continuously and economically.

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Stone floors; nothing wood but the doors.
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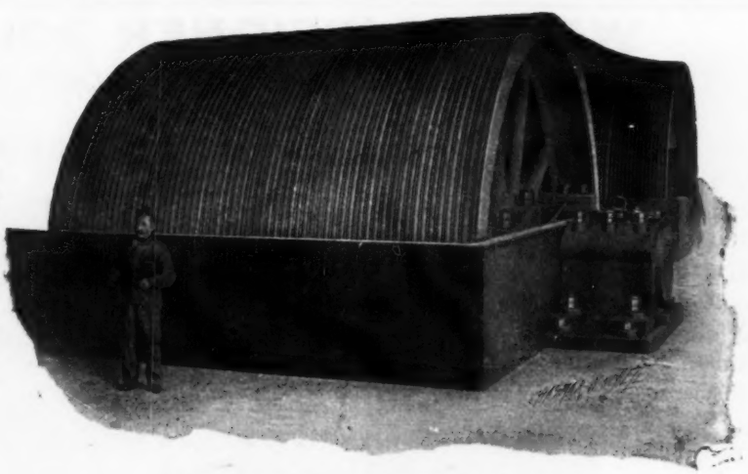

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Represents the proportion of the power you are paying for that is used in wearing out your machinery.

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Is friction's greatest foe, because, when fed to a bearing with oil or grease, it forms upon the bearing surfaces a permanent, almost frictionless, veneer—like coating which is fully effective in keeping the surfaces apart. A sample sufficient to prove this may be had free on request, with a copy of "Graphite as a Lubricant"—No. 34.

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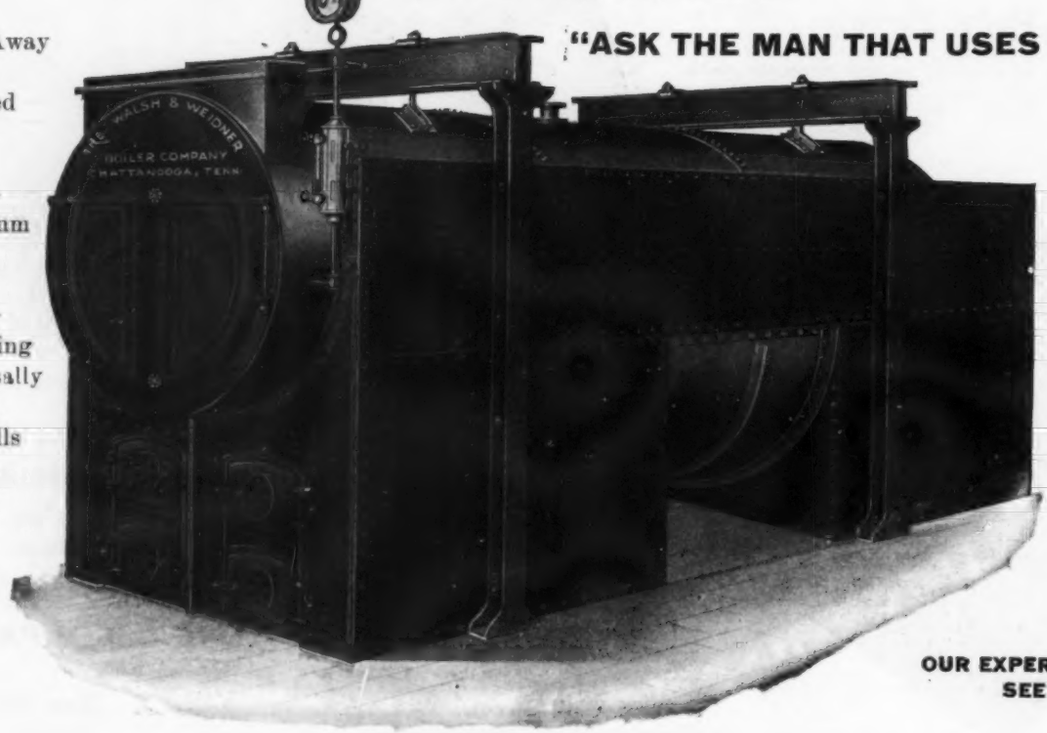

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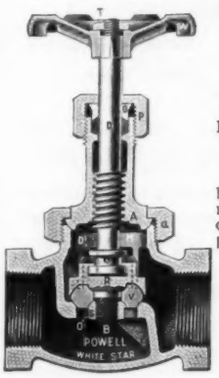

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Reversible—Regrindable—Renewable

Non-Corrosive "Powellium" Disc.—Union bevel ground joint connecting body and bonnet.—Threads on outside of body where steam can't reach them.—Stem can be packed under pressure.

Ask your dealer or write us.

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When you enjoy the economy of lubrication provided by

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you discover that increased production means a great deal more than a slightly lower lubricant expense.

Figure out the saving involved in a 50% reduction of oil stains in your Carding Twisting and Spinning. Then write us for test samples of NON-FLUID OIL for Comb-boxes, Roll Necks and Twister Rings.

Sole Manufacturers

New York & New Jersey Lubricant Co.

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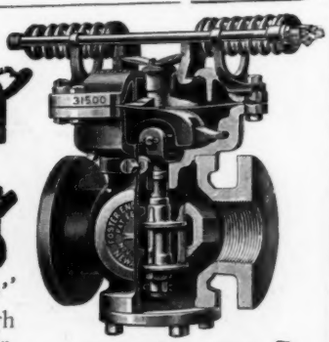
"Reliability Their Main Feature"



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For the reduction of high initial pressures of steam, air, water or gas to lower delivery pressures, the

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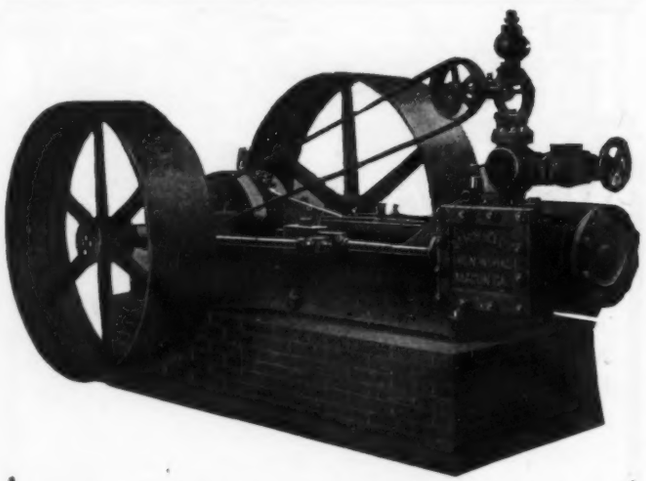

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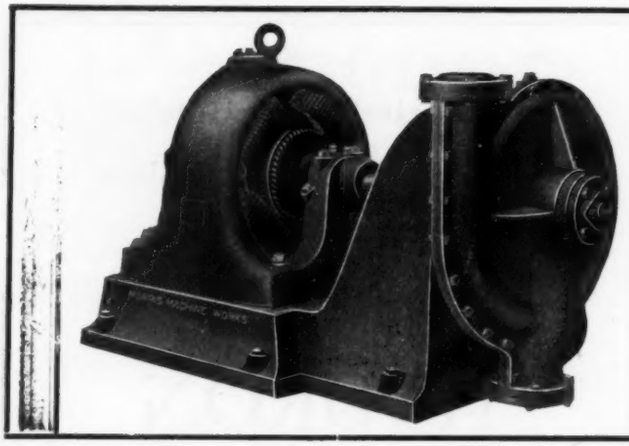

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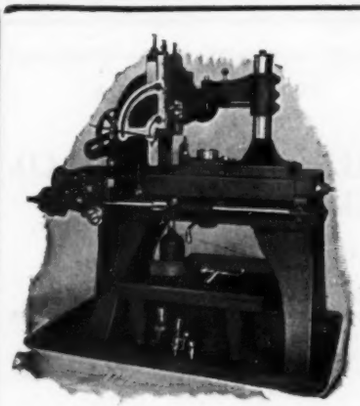

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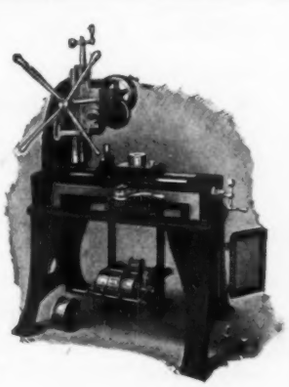

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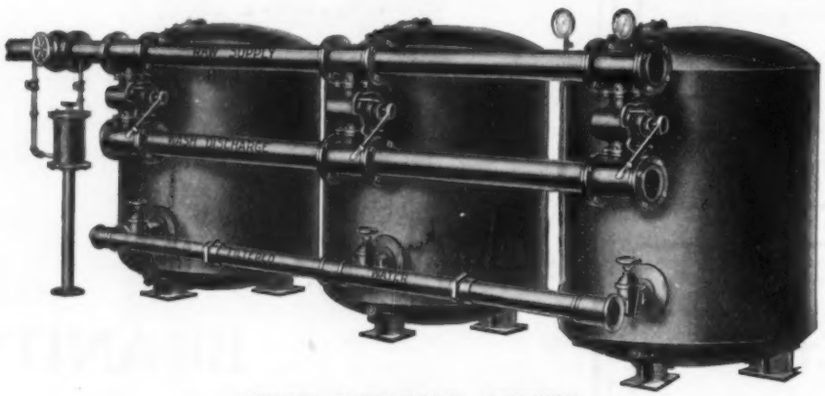

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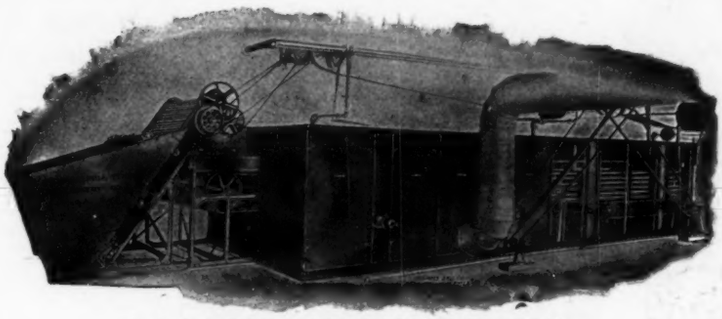

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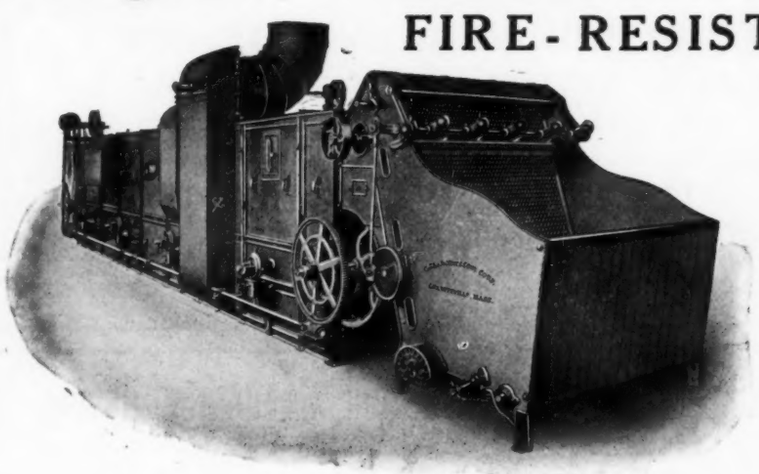

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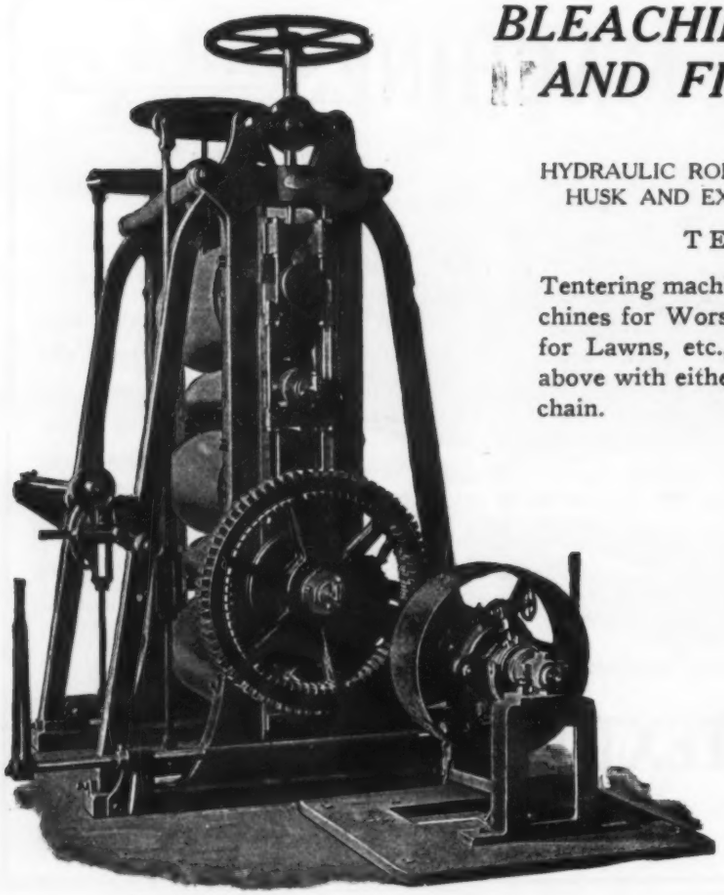

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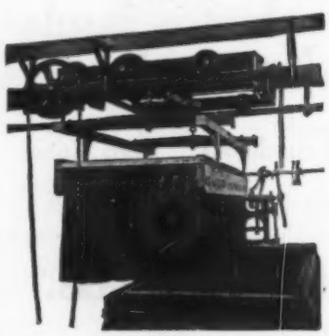

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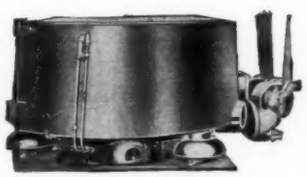

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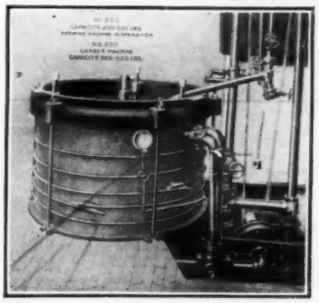

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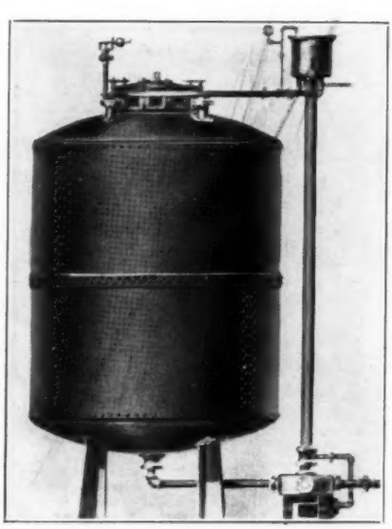

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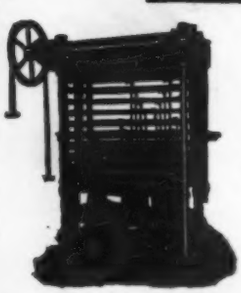

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